

## PATENT ABSTRACTS OF JAPAN

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(54) USER INTERFACE DEVICE AND BROADCAST RECEIVER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a user interface device etc. which improves the probability that a user easily designates a desired function in a household electrical appliance or a personal computer.  
SOLUTION: This user interface device which receives a user operation to a device and notifies the device of the execution instructions of various operations in accordance with the user operation specifies auxiliary menu item information meeting an auxiliary menu item display condition 1824 concerning user's past operation etc. among plural pieces of auxiliary menu item information 1820 and displays a menu item indicated in this information on a monitor. That is it predicts operations desired to be executed by the user by using the auxiliary menu item information provides a user interface that allows the user to select any of the predicted operations receives designation by the user

and notifies the device of the execution instruction of an operation designated by the user.

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## CLAIMS

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[Claim(s)]

[Claim 1]An user interface apparatus which receives user's operation to apparatus and notifies execution instruction of various operations to said apparatus according to user's operationcomprising:

A prediction means which predicts one or more operations which a user probably expects execution.

A user interface means to provide a user interface for making a user specify one of the operations about said one or more [ which was predicted that a user probably desires execution by said prediction means ] operationsand to receive specification by a user.

A reporting means which notifies execution instruction about operation concerning a user's specification received by said user interface means to said apparatus.

[Claim 2]The user interface apparatus according to claim 1 providing said user interface means spontaneously without waiting for offer directions according said user interface to a user.

[Claim 3]Said user interface apparatus is provided with the User Information storing means which stores User Information which is information still more peculiar to a userand said prediction meansThe user interface apparatus according to claim 2 performing said prediction based on said User Information stored in said User Information storing means after a state of said apparatus turns into a prescribed position.

[Claim 4]The user interface apparatus according to claim 3 which said User Information is the taste information about a user's tasteand is characterized by said prediction means predicting operation which suits a user's taste based on said taste information.

[Claim 5]The user interface apparatus according to claim 3 which said User Information is the life rhythm information about a user's life rhythmand is characterized by said prediction means predicting operation required when maintaining a user's life rhythm based on said life rhythm information.

[Claim 6]Said user interface is provided by displaying a picture for making a user specify either of said one or more [ which was predicted thatas for said user interface meansa user probably desires execution by

said prediction means ] operationsThe user interface apparatus according to claim 3wherein a partial picture which shows a reason for said prediction is included in said picture.

[Claim 7]Said apparatus is a picture of a received program a broadcast receiving set displayed on a monitorand said User Information storing meansStore said User Information about a user of said broadcast receiving setand said user interface meansThe user interface apparatus according to claim 3 providing said user interface by displaying a picture for making a user specify either of said one or more [ which was predicted that a user probably desires execution by said prediction means ] operations on said monitor.

[Claim 8]Have the followingand said User Information is taste of a user about a program shown program taste informationand said user interface meansWith reference to said race cardbased on said program taste informationare programs other than a program which said broadcast receiving set is receivingand a program suitable for a user's taste is searchedThe user interface apparatus according to claim 7 displaying a picture for making a user specify execution of operation which changes a receiving pair elephant of said broadcast receiving set to the program concerned on said monitor.

A race card storing means which stores a race card which comprises information relevant to a program of further plurality [ user interface apparatus / said ].

The User Information receiving means which receives an input of User Information by a user and is stored in said User Information storing means.

[Claim 9]Said user interface apparatus is provided with a race card storing means which stores a race card which comprises information relevant to further two or more programsand said User InformationAre sleeping time as a user's life rhythm the shown sleeping time informationand said user interface meansWith reference to said race card and said sleeping time informationfinish time and said sleeping time of a program which said broadcast receiving set is receiving are comparedThe user interface apparatus according to claim 7 displaying a picture for making a user specify execution of operation which records the program concerned when said finish time is later than said sleeping time on said monitor.

[Claim 10]The user interface apparatus according to claim 2 which is provided with the following and characterized by said prediction means performing said prediction based on said execution instruction

information currently held at said holding mechanism.

A commonplace maneuver receiving means which said user interface apparatus are user's operation other than said specification which said user interface means receives further and receives user's operation to said apparatus.

A general reporting means which notifies said execution instruction to said apparatus according to user's operation received by said commonplace maneuver receiving means.

Holding mechanism holding execution instruction information about said execution instruction according to user's operation received by said commonplace maneuver receiving means.

[Claim 11] When [ at which it is based on said apparatus ] an end of execution of one operation is detected perform said prediction means and said prediction said user interface means The user interface apparatus according to claim 10 characterized by providing said user interface when said prediction is made by said prediction means.

[Claim 12] Said apparatus records two or more programs and reproduce each program currently recorded are a program recording and reproducing device displayed on a monitor and said prediction means When it detects that one program in a series of programs was reproduced by said program recording and reproducing device A user predicts operation which reproduces a program which follows said one program in a series of programs as one of operations which probably desire execution and it said user interface means The user interface apparatus according to claim 11 providing said user interface by displaying a picture for making a user specify either of said one or more [ which was predicted that a user probably desires execution by said prediction means ] operations on said monitor.

[Claim 13] Have said prediction means and a priority storage parts store which memorizes further priority information which defined a priority about each operation of said apparatus said prediction means By referring to said priority information memorized by said priority storage parts store predict operation below or more 1 predetermined number and said commonplace maneuver receiving means Have a manual operation button which is a thing appropriated for a user's use display a picture for supporting a user's operation and user's operation corresponding to the picture concerned is received via the manual operation button concerned It has what said user interface means is a designation button which is a different thing from said manual operation button and is appropriated for a user's use Receive a user's specification via the designation button concerned and said reporting means When operation concerning a user's

specification received by said user interface means is what needs setup information based on a user's operation for the executionThe user interface apparatus according to claim 11 generating said execution instruction which included said setup information by referring to execution instruction information currently held at said holding mechanismand notifying the execution instruction concerned to said apparatus.

[Claim 14]The user interface apparatus according to claim 10 characterized by performing said prediction when it detects that all the operations of a user who should be made in order to perform one operation to said apparatus completed said prediction means.

[Claim 15]When operation concerning a user's specification received by said user interface means is what needs setup information based on a user's operation for the executionsaid reporting meansThe user interface apparatus according to claim 10 generating said execution instruction which included said setup information by referring to execution instruction information currently held at said holding mechanismand notifying the execution instruction concerned to said apparatus.

[Claim 16]Have said prediction means and a priority storage parts store which memorizes further priority information which defined a priority about each operation of said apparatus said prediction meansThe user interface apparatus according to claim 10 predicting operation below or more 1 predetermined number by referring to said priority information memorized by said priority storage parts store.

[Claim 17]They are user's operation other than said specification which said user interface means receives to said user interface apparatus panHave a commonplace maneuver receiving means which receives user's operation to said apparatusand said commonplace maneuver receiving meansHave a manual operation button which is a thing appropriated for a user's usedisplay a picture for supporting a user's operationand user's operation corresponding to the picture concerned is received via the manual operation button concernedThe user interface apparatus according to claim 2 having what said user interface means is a designation button which is a different thing from said manual operation buttonand is appropriated for a user's useand receiving a user's specification via the designation button concerned.

[Claim 18]A reception means which said apparatus is a broadcast receiving set which displays a received picture on a monitorand receives a program of a certain channelAfter a program of the 1st channel was continuously received by said reception means the 1st more than hourAfter a channel which said reception means receives according to

user's operation is changed have a state detecting means which detects that it is in a state in which the 2nd hour passed and said prediction means When said detection is made by said state detecting means as an operation for which a user will ask predict the 1st-channel [ said ] switching operation and said user interface means Display a picture for making a user specify execution of the 1st-channel switching operation predicted by said prediction means on said monitor receive specification by a user and said broadcast receiving set The user interface apparatus according to claim 2 controlling said reception means and making said program of the 1st channel receive when the 1st-channel switching operation is notified by said reporting means.

[Claim 19] Have the following and when said specification is received by said keyword receiving means said prediction means Based on an evaluation value corresponding to each operation stored in said evaluation value storing means Perform said prediction with specifying operation of a predetermined number sequentially from what has a large evaluation value and said user interface means The user interface apparatus according to claim 1 providing a user interface for making a user specify either of the operations of said predetermined number predicted by said prediction means.

An evaluation value storing means in which said user interface apparatus stores an evaluation value corresponding to each operation of said apparatus further.

A semantic-relations information storage means which memorizes semantic-relations information about semantic relation between each operation of said apparatus and two or more keywords of each.

A keyword receiving means which receives specification of said keyword by a user.

An evaluation value increasing means to which an evaluation value corresponding to operation which is semantically related to a keyword concerning an initializing means which initializes an evaluation value stored in said evaluation value storing means to a predetermined value and said specification received by said keyword receiving means with reference to said semantic-relations information is made to increase.

[Claim 20] Said keyword receiving means is an exclusive menu for making operation of said apparatus for which it asks to a user specify further An exclusive menu in which two or more at least one and keywords which have relation semantically were included among operations of said apparatus After building and displaying by referring to said semantic-

relations informationreceive specification of said keyword by a user and said user interface meansThe user interface apparatus according to claim 19 providing said user interface by displaying a picture for making a user specify either of the operations of said predetermined number.

[Claim 21]Have the following and said commonplace maneuver receiving means has a manual operation button which is a thing appropriated for a user's useDisplay a picture for supporting a user's operationreceive user's operation corresponding to the picture concerned via the manual operation button concernedand said user interface meansHave what is a designation button which is a different thing from said manual operation buttonand is appropriated for a user's useand said keyword receiving meansThe user interface apparatus according to claim 20wherein it receives specification of said keyword by a user via said designation button and said user interface means receives specification of said operation by a user via said designation button.

A commonplace maneuver receiving means which said user interface apparatus are said specification which said specification which said keyword receiving means receivesand said user interface means receive furtherand the user's operation of an exceptand receives user's operation to said apparatus.

A general reporting means which notifies said execution instruction to said apparatus according to user's operation received by said commonplace maneuver receiving means.

[Claim 22]A broadcast receiving set which displays a picture of a received program on a monitorcomprising:

An execution control means to control each part of the inside of a self-device according to the directions concernedand to perform various operations in response to directions.

The User Information storing means which stores User Information which is information peculiar to a user of a self-device.

After a state of a self-device turns into a prescribed positionbased on said User Information stored in said User Information storing meansA user interface means to display a picture for making a user specify execution of the operation concerned on said monitor about one or more operations predicted that a user probably desires executionand to receive specification by a user.

A reporting means which gives execution instruction of operation concerning a user's specification received by said user interface means to said execution control means.

[Claim 23] Said broadcast receiving set is provided with a race card storing means which stores a race card which comprises information relevant to further two or more programs and said User Information Are taste of a user about a program the shown program taste information and said user interface means The broadcast receiving set according to claim 22 displaying a picture for making a user specify execution of operation which are programs other than a program under reception searches a program suitable for a user's taste with reference to said race card based on said program taste information and changes a receiving pair elephant to the program concerned on said monitor.

[Claim 24] The broadcast receiving set according to claim 23 wherein said broadcast receiving set is provided with the User Information receiving means which receives an input of User Information by a user and is further stored in said User Information storing means.

[Claim 25] The broadcast receiving set according to claim 23 wherein said broadcast receiving set is provided with a reception program information acquisition means which acquires information about a program further received by referring to said race card and is stored in said User Information storing means by making the information concerned into said program taste information.

[Claim 26] Said broadcast receiving set is provided with a race card storing means which stores a race card which comprises information relevant to further two or more programs and said User Information Are sleeping time as a user's life rhythm the shown sleeping time information and said user interface means With reference to said race card and said sleeping time information finish time and said sleeping time of a program under reception are compared The broadcast receiving set according to claim 22 displaying a picture for making a user specify execution of operation which records the program concerned when said finish time is later than said sleeping time on said monitor.

[Claim 27] Said broadcast receiving set is provided with a temporary storage means which memorizes data of a received program temporarily further and said execution control means When execution instruction of said operation to record is told by said reporting means The broadcast receiving set according to claim 26 making the program concerned record on a recording means in a self-device from a portion received before a time of the execution instruction concerned being told using data of a program memorized by said temporary storage means.

[Claim 28] The broadcast receiving set according to claim 22 wherein a partial picture which shows a reason for said prediction is included in a picture which said user interface means displays.



[Claim 29] A broadcast receiving set which displays a received picture on a monitor comprising:

A reception means which receives a program of a certain channel.

A state detecting means which detects that it is in a state in which the 2nd hour passed after a channel which said reception means receives according to user's operation after a program of the 1st channel is continuously received by said reception means the 1st more than hour was changed.

A user interface means to display a picture for making a user specify execution of the 1st-channel [ said ] switching action on said monitor and to receive specification by a user when said detection is made by said state detecting means.

A reception control means which controls said reception means and makes said program of the 1st channel receive when a user's specification is received by said user interface means.

[Claim 30] The broadcast receiving set according to claim 29 wherein a partial picture which shows that the 2nd hour passed after a channel was changed into said picture which said user interface means displays from the 1st channel is included.

[Claim 31] A recording medium for which a program for performing user interface processing which receives user's operation to apparatus to a computer and makes said apparatus notify execution instruction of various operations to it according to user's operation was recorded comprising:

A prediction step said user interface processing predicts operation for which a user probably desires execution to be.

A user interface step which provides a user interface for making a user specify one of the operations about said one or more [ which was predicted that a user probably desires execution by said prediction step ] operations and receives specification by a user.

A notification step which notifies execution instruction about operation concerning a user's specification received by said user interface step to said apparatus.

[Claim 32] A recording medium which recorded a program for performing broadcast reception which displays a picture of a received program on a monitor on a computer comprising:

After a state of said computer turns into a prescribed position in said broadcast reception A user interface step which displays a picture for making a user specify execution of the operation concerned on said monitor and receives specification by a user about one or more operations

predicted that a user probably desires execution based on User Information which is information peculiar to a user.  
An execution step which performs operation concerning a user's specification received by said user interface step.

[Claim 33]A recording medium which recorded a program for performing broadcast reception which displays a picture of a received program on a monitor on a computercomprising:

A receiving step to which said broadcast reception receives a program of a certain channel.

A state detection step which detects that it is in a state in which the 2nd hour passed after a channel which said receiving step receives according to user's operation after a program of the 1st channel is continuously received by said receiving step the 1st more than hour was changed.

A user interface step which displays a picture for making a user specify execution of the 1st-channel [ said ] switching action on said monitorand receives specification by a user when said detection is made by said state detection step.

A reception change step which changes a receiving channel so that said program of the 1st channel may be received when a user's specification is received by said user interface step.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the broadcast receiving set which has user interfacessuch as electrical household appliances and electrical equipment and a personal computerand a user interface.

[0002]

[Description of the Prior Art]Televisionvideoan air-conditionerand other electrical household appliances and electrical equipment equip the equipment body with the button etc.in order to receive a user's operation.

Some are provided with a remote control.

Each supports one function of electrical household appliances and electrical equipmentandas for the button arranged on the equipment body or the remote controla character or a sign etc. which shows the contents

of the function is usually given to each button. Therefore the user can make electrical household appliances and electrical equipment perform the target operation by operating a button.

[0003] By the way it corresponds to diversification of a user's utilization object and the tendency for multi-functionalization of electrical household appliances and electrical equipment to progress can be seen in recent years for providing a much more convenient complex function for a user etc. If the button number allotted to the equipment body or the remote control increases with multi-functionalization of this apparatus the size of a remote control will become large and the problem that it becomes that a user is hard to have and it becomes difficult to find out the position of the button of the function which a user wants to use will arise.

[0004] What is provided with the navigational panel realized by software into multifunctional electrical household appliances and electrical equipment as what solves this problem is commercialized. This navigational panel is the graphical user interface which provided the picture display part in electrical household appliances and electrical equipment or drew the button image etc. by control of software to that picture display part using the monitor etc. which are the generating picture point of electrical household appliances and electrical equipment as a picture display part. A user performs selection operation of the button image displayed on the picture display part by operating a remote control etc. and specifying the position on the picture display part. A picture with a function equivalent to a button is called button image here.

[0005] Since this navigational panel is what is systematized and displays the button image corresponding to a majority of functions [ each of ] so that a hierarchical menu may be constituted even if the number of the button images which can be displayed at once is limited on restrictions of the resolution of a picture display part etc. it makes it possible to make a user choose all the functions. Here the menu refers to two or more whole button images which were displayed on the picture display part.

[0006] That is the software which realizes a navigational panel systematizes a majority of functions [ each of ] to a tree structure and it displays each button image on a picture display part so that a hierarchical menu may be displayed based on this. Therefore in aiming at for example choosing the function in which a user hits a low rank systematically. A user choosing the button image corresponding to the function of a higher rank from the function made into the purpose among the button images displayed on the picture display part By making a

screen change the button image corresponding to the function eventually made into the purpose can be chosen by repeating until the button image corresponding to the target function is displayed.

[0007] Drawing 34 is a figure showing the video system 9000 which is an example of conventional electrical household appliances and electrical equipment provided with the navigational panel which displays a hierarchical menu. The video system 9000 comprises the video recording playback equipment 9100, the monitor 9200 and the remote control 9300. The video recording playback equipment 9100 has functions such as recording of video playback and a television display. The television signal for the signal for detecting the signal sent out from the remote control 9300 and performing each function according to this and displaying a navigational panel on the monitor 9200, video recovery and a television display is outputted to the monitor 9200.

[0008] The navigational panel 9210 drawn on the picture display part of the monitor 9200 is realized by the software of video recording playback equipment 9100 inside.

The cursor 9211, playback and the drawn button image 9212, reservation of picture recording and the drawn button image 9213, recording and the drawn button image 9214, TV and the drawn button image 9215 and "setting out" and the drawn button image 9216 are displayed.

[0009] The remote control 9300 sends out the signal which receives a user's operation and shows the operation to the video recording playback equipment 9100.

It has the remote control buttons 9310, 9320, 9330 and 9340 for moving the cursor 9211 displayed on the navigational panel 9210 vertically and horizontally and the remote control button 9350 for opting for selection of the button image to which the cursor 9211 is pointing.

For example, if a user does the depression of the remote control button 9330, the cursor 9211 will move downward.

[0010] Drawing 35 is a figure showing the layered structure of the function item displayed as a button image in the navigational panel 9210. As shown in the figure, each function item is related so that a tree structure may be constituted. For example, the function item of "searching and reproducing" is positioned by the subordinate of the function item of "reproduction."

[0011] When one button image of the navigational panels 9210 is chosen by the user, the navigational panel 9210 changes display information based on the layered structure shown in drawing 35. Operation of the user in the case of wanting to display television is as follows to this video system

9000.

[0012]First a user does the depression of the remote control button 9340 seeing the navigational panel 9210 of the state which shows in drawing 34. Corresponding to this operation the cursor 9211 on the navigational panel 9210 moves to the right and points to "TV" and the drawn button image 9215. Next a user does the depression of the remote control button 9350. Thereby it means that the button image 9215 was chosen and the display of television is performed.

[0013]

[Problem(s) to be Solved by the Invention] However for the user who does not grasp the hierarchical system about a function enough when a desired function is located in the low rank of a system there is a problem that it becomes difficult to choose the function in conventional electrical household appliances and electrical equipment provided with the navigational panel which displays an above-mentioned hierarchical menu.

[0014] In order to plan a user's convenience to electrical household appliances and electrical equipment when a complex function and a special function are provided if it may be difficult to even position the complex function and special function in a hierarchical menu intelligible for a user and the complex function and special function are positioned by force at a hierarchical menu in such a case. Since the functional body system which the hierarchical menu shows becomes much more complicated it becomes difficult [ it / to grasp a functional body system thoroughly ] for a user and the above-mentioned problem becomes much more remarkable.

[0015] For example it has the same higher rank menu as the video system 9000 shown in conventional technology (refer to drawing 34). When there is an apparatus which has the complex function "to delete the information on the program which reproduction completed" it is hard for a user to grasp where [ of the menu system ] the function is positioned. The special function of "changing reception to the program suitable for a user's liking" will become what cannot be grasped for a user even if it is hard to position in the usual menu system and positions by force.

[0016] An above-mentioned problem poses a problem similarly in the personal computer which has various functions. Then this invention sets it as the 1st purpose for it to be made in view of such a problem and to provide the user interface apparatus which raises the probability that a user can specify a desired function easily from electrical household appliances and electrical equipment or a personal computer.

[0017] It sets it as the 2nd purpose providing the user interface apparatus which proposes execution of a specific special function to a user at the time of necessity and to provide the broadcast receiving set

provided with the user interface apparatus concerned.

[0018]

[Means for Solving the Problem]An user interface apparatus which this invention requires for an achievement sake in the 1st purpose of the above at this invention receives user's operation to apparatus and is characterized by that an user interface apparatus which notifies execution instruction of various operations to said apparatus according to user's operation comprises the following.

A prediction means which predicts one or more operations which a user probably expects execution.

A user interface means to provide a user interface for making a user specify one of the operations about said one or more [ which was predicted that a user probably desires execution by said prediction means ] operations and to receive specification by a user.

A reporting means which notifies execution instruction about operation concerning a user's specification received by said user interface means to said apparatus.

[0019]In order that a system provided with an user interface apparatus concerning this invention by the above-mentioned composition may predict functional operation for which a user asks probability that the user can perform execution instruction of desired functional operation simply increases. Since a user interface that execution of the functional operation concerned can be performed only by specifying about predicted functional operation is provided even if it does not discover desired functional operation from a deep hierarchy's hierarchical menu a user becomes easy [ execution instruction ]. Hereit says specifying functional operation prediction is not directly instructed to be by user based on information etc. which a state of apparatus and a user inputted for example.

[0020]According to the user interface apparatus concerning this invention. For example recommendation of execution instruction of functional operation that there is meaning of execution although an immediate execute is not necessarily required which recommends a user execution instruction of functional operation which leads to the resource release in the state of a system resource where it became insufficient feeling somewhat is also attained. Therefore execution instruction of functional operation for which it will ask if it is recommended although a user has not done consciousness at the time can also be made to give a user easily.

[0021]A broadcast receiving set which this invention requires for this

invention in order to attain the 2nd purpose of the above is characterized by that a broadcast receiving set which displays a picture of a received program on a monitor comprises:

An execution control means to control each part of the inside of a self-device according to the directions concerned and to perform various operations in response to directions.

The User Information storing means which stores User Information which is information peculiar to a user of a self-device.

After a state of a self-device turns into a prescribed position based on said User Information stored in said User Information storing means, a user interface means to display a picture for making a user specify execution of the operation concerned on said monitor about one or more operations predicted that a user probably desires execution and to receive specification by a user.

A reporting means which gives execution instruction of operation concerning a user's specification received by said user interface means to said execution control means.

[0022] By the above-mentioned composition, a broadcast receiving set concerning this invention, since it is what displays a button image for predicting operation for which a user will ask based on a situation peculiar to a user etc. and specifying a predicted recommended action etc. on a monitor, a user can make a recommended action perform to a broadcast receiving set simply by carrying out the depression of the button image concerned etc. via input devices such as a remote control now. Therefore, this invention is not general operation, provides a user interface for making a user of the broadcast receiving set concerned specify a recommended action for exclusive use and thereby attains the 2nd purpose.

[0023]

[Embodiment of the Invention] Hereafter, an embodiment of the invention is described using figures.

Below, <Embodiment 1> explains the user interface apparatus concerning the embodiment of the invention 1 using drawing 13 from drawing 1.

[0024] <Composition> drawing 1 is a lineblock diagram of the digital broadcasting receiving system 1000 provided with the user interface apparatus concerning the embodiment of the invention 1. The digital broadcasting receiving system 1000 is constituted by the recording playback equipment 1100, the monitor 1200 which displays a picture, and the remote control 1300 which receives user's operation and tells the recording playback equipment 1100.

[0025]The recording playback equipment 1100 is provided with the following.

Have an infrared light sensing portionthis detects the signal sent out from the remote control 1300 based on user's operationand it corresponds to this user's operationThe function to receive and record the program of digital broadcastingthe function which plays the recorded programetc. are performedthe picture for displaying the reproduced image of a program and the menu for a selection of function is outputted to the monitor 1200and it is the control section 1110.

Records Department 1120.

Broadcast receiving antenna 1130.

The receive section 1140the coding part 1150the regenerating section 1160and the outputting part 1170.

[0026]Herethe control section 1110 has CPUand a memory and other storage parts stores the execution control function which controls operation of each part of the recording playback equipment 1100 is realized according to the signal sent out from the remote control 1300and the program for such control is stored in the storage parts store. For examplethe control section 1110 is an electronic program guide ( ) among the information which the receive section 1140 received. [ EPG:Electric Program Guide and ] Hereafterit is called a race card. The receive section 1140 is made [ receiving information and outputting the picture of a race card to the monitor 1200 via the outputting part 1170 based on thisor ] to receive the program of the channel directed to the userThe viewing-and-listening request to print out files after program retrieving and searchrecord of a viewing historythe receive state test of an antennaetc. are controlled.

[0027]The race card includes informationincluding program content explanation etc.with a program identifier including broadcast-times informationa program namethe genrethe subgenrethe program attributeand the performerand the information on the program for one week is sent for every hour. a genre is a sport etc.for example and subgenres are soccerbaseballetec. -- a program attribute -- for examplea continuation program \*\*\*\*\* -- etc. -- it means.

[0028]The control section 1110 realizes a user interface control facilityand it passes the picture of a menu to the outputting part 1170 in order to display the menu which is a graphical user interface for making a user choose a function on the monitor 1200. A menu comprises two or more button images and cursorand a basic menu with a fixed hierarchy and the auxiliary menu displayed only in a specific situation



are contained in this menu. Here a button image says the picture which drew the character string which shows the function of the recording playback equipment 1100 like the button image explained in conventional technology.

[0029] The Records Department 1120 has a hard disk or DVD-RAM and can store mass image data. The receive section 1140 A tuner the system stream decoder of MPEG (Motion Picture Expert Group) Including an image audio decoder etc. of MPEG via the broadcast receiving antenna 1130 a digital broadcasting program can be received and it can get over and packet separation can be carried out the program according to a user's directions can be decoded and in addition to reception of various programs a race card can also be received.

[0030] The coding part 1150 carries out compression encoding of the picture and the regenerating section 1160 reproduces the program currently recorded on the Records Department 1120. If the outputting part 1170 is passed the data for displaying a picture from the regenerating section 1160 and the control section 1110 it will compound these if needed and will output them to the monitor 1200 as a television signal.

[0031] The power button 1310 of the meaning [ ON-OFF / the remote control 1300 / a meaning / the power supply of the recording playback equipment 1100 ] The menu button 1320 of the meaning on which the monitor 1200 is made to display the basic menu for the selection of function as a graphical user interface The cursor advance buttons 1330 1340 1350 and 1360 for moving the cursor displayed on the monitor 1200 It has the determination button 1370 for opting for selection of a button image and the button 1380 for auxiliary menu manipulation and when one of buttons is pushed on a user the signal for identifying the button pushed on the recording playback equipment 1100 is sent out.

[0032] The button 1380 for auxiliary menu manipulation is a button for exclusive use for operating an auxiliary menu it consists of the auxiliary cursor advance buttons 1382 and 1383 for moving the cursor for exclusive use for choosing the button image displayed in the auxiliary menu and the auxiliary determination button 1381 for opting for selection of a button image. Hereafter the functional constitution of the control section 1110 which realizes an execution control function and a user interface control facility is explained.

[0033] Drawing 2 is a functional block diagram of the control section 1110. The execution control function and user interface control facility of the control section 1110 The operation reception part 141 and execution instruction and an equipment-state-information storage parts

store 1412The functional execution control part 1413the image data memory section 1414and the auxiliary menu indication timing control section 1415The auxiliary menu item deciding part 1416the auxiliary menu item information storage part 1417the auxiliary menu control section 1418the auxiliary menu manipulation reception part 1419and the auxiliary menu indication part 1420 are realized.

[0034]The image data memory section 1414 has memorized beforehand the image data for displaying the screen for receiving setup information required in order to perform a basic menuan auxiliary menuand a function from a user. The operation reception part 1411 by referring to the basic menu indication control information which detects the signal sent out from the remote control 1300and is stored in the execution instruction and the equipment-state-information storage parts store 1412 mentioned laterWhen it notifies the functional execution control part 1413 that the display of cursor is moved according to a user's operation and a user chooses one button imagethe execution control information later mentioned corresponding to the button image to execution instruction and the equipment-state-information storage parts store 1412 is stored.

[0035]While the functional execution control part 1413 decodes a user's directionscontrols each part of the recording playback equipment 1100 if needed by referring to execution instruction and the equipment-state-information storage parts store 1412 and performs the function corresponding to a user's directionsRenewal of the information memorized by execution instruction and the equipment-state-information storage parts store 1412 is also performed. The functional execution control part 1413 passes the picture of the screen for receiving from a user setup information required in order to perform a basic menu and a function with reference to the image data stored in the image data memory section 1414 if needed to the outputting part 1170.

[0036]Herethe memory content of execution instruction and the equipment-state-information storage parts store 1412 is explained using drawing 3 and drawing 4. Drawing 3 is a figure showing the data which execution instruction and the equipment-state-information storage parts store 1412 memorizeand drawing 4 is a figure showing the basic menu hierarchy structure information included in the basic menu indication control information memorized by execution instruction and the equipment-state-information storage parts store 1412.

[0037]As shown in drawing 3execution instruction and the equipment-state-information storage parts store 1412 store the execution control information which consists of basic menu indication control informationequipment state informationand execution instruction

information and execution control information. Basic menu indication control information consists of basic menu hierarchy structure information (refer to drawing 4) memorized beforehand and information which is information updated by the operation reception part 141 and holds which item in a menu cursor has pointed out.

[0038] Equipment state information includes the information about the information which shows empty disk storage capacity the default disk information which shows any the disks chosen among the disks of the Records Department 1120 now are and recording image quality and is referred to it for it and updated by the functional execution control part 1413. Execution control information is stored by the operation reception part 1411 or the auxiliary menu control section 1418 and is referred to it for it and updated by the functional execution control part 1413.

[0039] The execution instruction information in execution control information is information to which a value becomes settled based on a user's operation is information required for execution of each function of the recording playback equipment 1100 and consists of a major item a mean eye a subparagraph the setting out 1 the setting out 2 the setting out 3 the object 1 the attribute 1 the object 2 the attribute 2 and a subcommand. However a subcommand is command description which described the function which should be carried out an immediate execute and only when either of the information from the setting out 1 to the attribute 2 becomes settled by execution of a subcommand it is needed.

[0040] Here a major item a mean eye and a subparagraph are stored based on a user's selection operation in the value defined beforehand in order to classify into size inside and a subparagraph the function which should be performed according to the hierarchy of a basic menu and to identify the function. The setting out 1 the setting out 2 and the setting out 3 are the setup information corresponding to a major item a mean eye and a subparagraph respectively the object 1 and the object 2 are information which shows the object of the function which should be performed and the attribute 1 and the attribute 2 are information which shows the character about the object 1 and the object 2 etc. respectively.

[0041] The execution control information in execution control information has a value which serves as above-mentioned execution instruction information and a pair shows in what kind of operation step it is now about execution of the function shown using execution instruction information and shows either "in [ performed ]" "un-decoding" execution waiting and "during execution." Here un-decoding shows the meaning that the decipherment of execution instruction information is not made.

[0042]Two or more such execution control information is also storable in execution instruction and the equipment-state-information storage parts store 1412. About that [ finishing / among execution control information / that / execution of execution control information ]when the functional execution control part 1413 exceeds a predetermined numberit deletes that it became finishing performing in the past. Drawing 5 is a figure showing an example of the data which execution instruction and the equipment-state-information storage parts store 1412 memorize.

[0043]The figure shows the example about information other than basic menu indication control informationand shows the state where execution control information is stored only one. In this examplethe major item of execution instruction information "reservation of picture recording" and a mean eye "It searches and reserves, Search from a race card" and the setting out 1 of a subparagraph "high definition" and the setting out 2 "Nothing"Nothingand the object 1 the setting out 3 "\*\*0xx .... the time etc. which should be recorded"As for the attribute 1the disk land the attribute 2 of a "drama" and the object 2 are "nothing"A subcommand is not set upbut execution control information is "the waiting for execution"andas for the empty disk storage capacity of equipment state informationthe disk land the recording image quality of "10GByte" and default disk information are "high definition." Although values such as "reservation of picture recording"are binary codes in practicethey are expressed in written form for explanation.

[0044]Hereafterit returns to explanation of each part which realizes the function of the control section 1110 again. The auxiliary menu indication timing control section 1415When the function corresponding to directions by a user's operation becomes the waiting for executionor when the end of execution is carried outa notice is received from the functional execution control part 1413It has the function to issue directions in order to make determination operation of the item which constitutes an auxiliary menu from timing relevant to the time of these notices in the auxiliary menu item deciding part 1416 start.

[0045]The auxiliary menu item deciding part 1416 has the function to determine the item which constitutes an auxiliary menuBy issuing [ updating the equipment state information in execution instruction and the equipment-state-information storage parts store 1412 to the functional execution control part 1413and ] directionsand referring to execution instruction and the equipment-state-information storage parts store 1412and the auxiliary menu item information storage part 1417The auxiliary menu item which constitutes an auxiliary menu is determinedand the determined auxiliary menu item is notified to the auxiliary menu

control section 1418.

[0046]The auxiliary menu item deciding part 1416 determines as many auxiliary menu items which constitute an auxiliary menu as possible or less by five. Therefore an auxiliary menu will comprise a maximum of five auxiliary menu items. A picture required in order to display an auxiliary menu on the monitor 1200 in response to directions of the auxiliary menu control section 1418 is acquired by referring to the image data memory section 1414 and the auxiliary menu indication part 1420 passes it to the outputting part 1170.

[0047]The auxiliary menu manipulation reception part 1419 detects operation of the button 1380 for auxiliary menu manipulation by a user and tells the auxiliary menu control section 1418. The auxiliary menu control section 1418 receives the auxiliary menu indication part 1420. Directions are issued so that the auxiliary menu which consists of an item notified from the auxiliary menu item deciding part 1416 may be displayed. If directions of the purport that cursor is moved are taken out to the auxiliary menu indication part 1420 based on operation by the user told from the auxiliary menu manipulation reception part 1419 and operation by a user is selection of the button image in an auxiliary menu. The execution control information for performing the function of the recording playback equipment 1100 corresponding to the button image chosen as the user is stored in execution instruction and the equipment-state-information storage parts store 1412.

[0048]Here the data memorized to the auxiliary menu item information storage part 1417 is explained. Drawing 6 is a figure showing the data which the auxiliary menu item information storage part 1417 memorizes. As shown in the figure the auxiliary menu item information storage part 1417 has memorized beforehand auxiliary menu item information required for the display control of the auxiliary menu item for two or more items of every beforehand defined as what can serve as an item which constitutes an auxiliary menu.

[0049]Auxiliary menu item information is information referred to from the auxiliary menu item deciding part 1416 and the auxiliary menu control section 1418 and is constituted including an auxiliary menu item name, auxiliary menu execution instruction information, the auxiliary menu item priority, and the auxiliary menu item display condition. An auxiliary menu item name is a character string which should be drawn on the button image of an auxiliary menu and shows the contents of the function of the recording playback equipment 1100 performed when the button image is chosen by the user.

[0050]When the button image of the auxiliary menu item corresponding to

this is chosen from a user auxiliary menu execution instruction information. It is the information which directs the execution about the function which the recording playback equipment 1100 is made to perform and the same contents as the execution instruction information stored in the execution instruction and the equipment-state-information storage parts store 1412 mentioned above are shown. An auxiliary menu item display condition is the information about the conditions for displaying the auxiliary menu item corresponding to this and this condition is conditions about the contents of execution control information and equipment state information stored in execution instruction and the equipment-state-information storage parts store 1412.

[0051] It is the information referred to when the auxiliary menu item deciding part 1416 determines whether an auxiliary menu item priority displays the auxiliary menu item corresponding to this as an auxiliary menu and will be more preferentially displayed as an auxiliary menu by the thing which has a high priority. Drawing 7 and drawing 8 are the figures showing the example of the auxiliary menu item information memorized by the auxiliary menu item information storage part 1417.

[0052] They are on the auxiliary menu item information 1810 shown in drawing 7 and the character string data [ name / auxiliary menu item ] "deletion of a reproduced file". The major item of auxiliary menu execution instruction information "setting out" and a mean eye "File deletion". Deletion of a reproduced file. The setting out 1: the setting out 2: the setting out 3: the object 1: the attribute 1: the object 2: and the attribute 2 of a subparagraph are "nothing". An auxiliary menu item priority is "1" and auxiliary menu item display conditions are "major item == reproduction, an execution control information == execution settled and empty disk-storage-capacity < 2GByte."

[0053] Here == shows equivalence and although data other than an auxiliary menu item name is binary data it is expressed by Monju for explanation. This auxiliary menu item information 1810 is in the state which reproductive execution ended and if empty disk storage capacity is less than 2 GByte it is information with the meaning that the item of "deletion of a reproduced file" can be displayed on an auxiliary menu.

[0054] They are on the auxiliary menu item information 1820 shown in drawing 8 and the character string data [ name / auxiliary menu item ] of "being broadcast reservation of picture recording next time". The major item of auxiliary menu execution instruction information "reservation of picture recording" and a mean eye "It searches and reserves, Search from a race card" and the setting out 1 of a subparagraph "getmode" the setting out 2 and the setting out 3 "Nothing". As for the object

nothing and the object 2 "search" and the attribute 1 "getdisk" The attribute 2 is "nothing" and a subcommand "getmode search (EPG for [ 1 ] ?NEXT) It is getdisk (default)" an auxiliary menu item priority is "2" and an auxiliary menu item display condition is "or (major item = finishing [ the waiting or execution for = reservation of picture recording and execution control information == execution ]) (major item = finishing [ = reproduction and execution control information == execution ])." "

[0055] In order to compensate the information from a major item to the attribute 2 the function which should be carried out an immediate execute is described by the subcommand here and getmode Are set up recording image quality a function to obtain and search (EPG for [ 1 ] ?NEXT) It is the function to search the program information about a part for next broadcast of the program shown for [ 1 ] ? from the race card of digital broadcasting and getdisk (default) is the function to acquire default disk information. The ? object 1 becomes what copied the value of the object 1 of the execution instruction information concerning the condition which agreed when the contents of execution instruction and the equipment-state-information storage parts store 1412 are judged to have agreed in the auxiliary menu item display condition by the auxiliary menu item deciding part 1416.

[0056] This auxiliary menu item information 1820 is information with the meaning that it can display the item of "being broadcast reservation of picture recording next time" on an auxiliary menu if reservation of picture recording is in execution waiting the state where it has performed or the state where reproduction has performed.

Below <operation> explains operation of the digital broadcasting receiving system 1000 provided with above-mentioned composition.

[0057] The recording playback equipment 1100 performs recording playback etc. of digital broadcasting under control of the control section 1110. Recording operation of the recording playback equipment 1100 is performed by the receive section 1140 receiving the electric wave which information including a program etc. multiplexed and was broadcast via the broadcast receiving antenna 1130 extracting the information on a required program carrying out compression encoding in the coding part 1150 and storing in the Records Department 1120.

[0058] Reproduction motion of the recording playback equipment 1100 is performed with the regenerating section 1160 incorporating the information on the program stored in the Records Department 1120 and outputting to the monitor 1200 via the outputting part 1170. The control section 1110 by displaying the screen for user inputs following a basic

menu or thisIt predicts what the function which receive a user's directionsand each functionsuch as recording and playbackis performed according to thisand also a user expects to the next isand a user is provided with the user interface for making the function choose in the form of an auxiliary menu. Hereit says that prediction specifies the functional operation which is not directly directed by the user.

[0059]Hereafterin response to a user's operationoperation of the digital broadcasting receiving system 1000 is explained in detail focusing on the operation of the control section 1110 which carries out each functional operationsuch as the above-mentioned recording and playbackto the recording playback equipment 1100and displays an auxiliary menu. In the following explanationthe situation of liking to carry out reservation of picture recording of a drama program with a user first is assumed.

[0060]If a user does the depression of the menu button 1320 of the remote control 1300the remote control 1300 sends out the signal which notifies thatand the operation reception part 1411 of the control section 1110 will detect thisand will require the display of a basic menu of the functional execution control part 1413. In responsethe functional execution control part 1413 passes the picture which should display a basic menu on the outputting part 1170 using the image data stored in the image data memory section 1414.

[0061]As a resultthe outputting part 1170 outputs a television signal to the monitor 1200and a basic menu is displayed on the monitor 1200. If a user does the depression of the cursor advance button 1350 of the remote control 1300 after a basic menu is displayed on the monitor 1200The remote control 1300 sends out the signal which notifies thatand the operation reception part 1411 of the control section 1110 detects thisThe information holding the cursor position in the basic menu indication control information stored in execution instruction and the equipment-state-information storage parts store 1412 is updatedand movement of cursor is directed in the functional execution control part 1413.

[0062]In responsethe functional execution control part 1413 displays the picture which moved cursor downward on the monitor 1200 via the outputting part 1170. As a resultthe monitor 1200 will be in the state where the basic menu as shown in the picture state 2010 of drawing 9 was displayed. Drawing 9 is a figure showing transition of the screen of the monitor 1200 corresponding to a user's operation.

[0063]If a user does the depression of the determination button 1370 of the remote control 1300 after the screen of the monitor 1200 will be in



the picture state 2010The remote control 1300 sends out the signal which notifies thatthe operation reception part 1411 of the control section 1110 detects thisand the basic menu indication control information stored in execution instruction and the equipment-state-information storage parts store 1412 is referred toThe functional execution control part 1413 is required to display the function item (refer to drawing 4) of the hierarchy of the low rank of the "reservation of picture recording" which the cursor position chosen as the user shows.

[0064]In responsethe functional execution control part 1413 displays a basic menu as shown in the monitor 1200 via the outputting part 1170 at the picture state 2020 using the image data stored in the image data memory section 1414. Hereaftersimilarlyif a user does the depression of the determination button 1370 of the remote control 1300If the function item (refer to drawing 4) of the hierarchy of the low rank of "searching and reserving" is displayed on the monitor 1200 and a user does the depression of the cursor advance button 1350 furtherthe screen displayed on the monitor 1200 will be in the state where it is shown in the picture state 2030.

[0065]When a user does the depression of the determination button 1370 of the remote control 1300 furtherin this state the operation reception part 1411The signal sent out from the remote control 1300 like \*\*\*\* is detectedand one execution control information is stored in execution instruction and the equipment-state-information storage parts store 1412 with reference to the basic menu indication control information stored in execution instruction and the equipment-state-information storage parts store 1412.

[0066]The operation reception part 1411 here the execution control information (refer to drawing 3) stored in execution instruction and the equipment-state-information storage parts store 1412Reservation of picture recordingand a mean eye are [ "searching and reserving" and a subparagraph ] "search from a race card"and the major item of execution instruction information "has not decoded" execution control informationand let all other items be the values for which "it is nothing" is shown. The execution control information stored in execution instruction and the equipment-state-information storage parts store 1412 by the operation reception part 1411 is decoded by the functional execution control part 1413.

[0067]Hereoperation of the functional execution control part 1413 relevant to execution control information is explained. Drawing 10 is a flow chart which shows operation of the functional execution control part 1413 relevant to execution control information. Although the

functional execution control part 1413 performs operation shown in the flow chart of the figure it can also perform other operations in parallel with the operation shown in the flow chart of the figure.

[0068] It is judged whether the functional execution control part 1413 "has not decoded" the execution control information in execution control information paying attention to [ one / of them ] the case where one or more execution control information is stored in execution instruction and the equipment-state-information storage parts store 1412 (Step S101) (Step S102). When execution control information "has not been decoded" the functional execution control part 1413 If it judges whether the execution instruction information in execution control information has a subcommand (Step S107) and there is a subcommand a function will be performed based on the subcommand and the execution instruction information will be updated (Step S108).

[0069] After the processing (Step S107S108) about a subcommand the functional execution control part 1413 judges whether it is what needs directions by a user in order the execution instruction information in execution control information is imperfect and to make this execution instruction information perfect (Step S103). The value except "nothing" not being set as the setting out 1 of execution instruction information for this judgment the contents of the major item of execution instruction information a mean eye and the subparagraph etc. are used for the functional execution control part 1413.

[0070] When it is judged that directions by a user are needed in Step S103 It acquires the data of a picture required for the function specified using execution instruction information from the image data memory section 1414 or the receive section 1140 in order to urge a user's operation to the functional execution control part 1413 The screen for an input is displayed on the monitor 1200 via the outputting part 1170 and the information which the user inputted via the operation reception part 1411 is acquired (Step S104).

[0071] In operation of Step S104 the operation reception part 1411 If a user's input is received the item from the setting out 1 of the execution instruction information in stored execution control information to the attribute 2 will be updated according to a user's input to execution instruction and the equipment-state-information storage parts store 1412 and if it chooses that a user cancels execution of a function it will be notified to the functional execution control part 1413.

[0072] If the functional execution control part 1413 receives the notice which chose that a user canceled execution of a function from the operation reception part 1411 in Step S104 (Step S105) The execution

control information to which its attention is paid is deleted (Step S106) and it returns to the view processing to other execution control information (Step S101). When it is judged that directions by a user are not needed in Step S103 or when cancellation is not chosen in Step S105, the functional execution control part 1413 judges whether the function shown by the major item of execution instruction information is a request-to-print-out-files type function. If it is a request-to-print-out-files type function, it is not performed immediately (Step S109). For example, since "reservation of picture recording" has a state of waiting before performing recording operation, it is judged in the affirmative at Step S109.

[0073] When it is judged that it is a request-to-print-out-files type function in Step S109, the functional execution control part 1413 updates execution control information with "the waiting for execution" and notifies the timing used as the cause which displays an auxiliary menu on the auxiliary menu indication timing control section 1415 (Step S111) and returns to processing of Step S101. The timing to which the functional execution control part 1413 updates execution control information with "the waiting for execution" is equivalent to the timing which all operations that should be performed in order to perform the function which has a user to the recording playback equipment 1100 completed.

[0074] In Step S102, when execution control information is judged [ "having decoded" and ] it is judged whether the functional execution control part 1413 has resulted. When execution control information is "the waiting for execution" and it should perform from the contents of execution instruction information (Step S112). In Step S112, when judged in the negative, the functional execution control part 1413 returns to processing of Step S101.

[0075] When judged in the affirmative at Step S112 or when it is judged at Step S109 that it is not a request-to-print-out-files type function, the functional execution control part 1413 updates the execution control information in execution control information "during execution" (Step S113) and performs the function specified using the execution instruction information in execution control information (Step S114). After performing a function in Step S114, the functional execution control part 1413 updates the execution control information in execution control information to "finishing [ execution ]" (Step S115). The timing used as the cause which displays an auxiliary menu on the auxiliary menu indication timing control section 1415 is notified (Step S116) and it returns to processing of Step S101.

[0076] The functional execution control part 1413 can detect the end of

execution of the function according to each part of the recording playback equipment 1100 by receiving the signal which notifies the end of functional execution from each part of the recording playback equipment 1100 for example etc. and changes execution control information into "the state where it has performed" after this detection. Concrete operation of the functional execution control part 1413 in the state where execution control information which the operation reception part 1411 mentioned above hereafter to execution instruction and the equipment-state-information storage parts store 1412 as a result as which the user chose "a race card to search" in the picture state 2030 of drawing 9 was stored is explained.

[0077] First reservation of picture recording and a mean eye are [ "searching and reserving" and a subparagraph ] "search from a race card" the major item of execution instruction information "has not decoded" execution control information and the functional execution control part 1413 pays its attention to the execution control information made into the value for which all other items show "it is nothing" (Step S101). Since the functional execution control part 1413 judges [ "not having decoded" and ] execution control information (Step S102) it judges that there is no subcommand (Step S107) and the setting-out 1 grade of execution instruction information is not set up by the user. Judge that user directions are required (Step S103) control the receive section 1140 that it should correspond to "search" which is a subparagraph from a race card obtain the data of a race card and a picture is generated. It displays on the monitor 1200 via the outputting part 1170 and a user's operation is received via the operation reception part 1411 (Step S104).

[0078] As a result the screen shown in the picture state 2040 of drawing 11 is displayed on the monitor 1200. Drawing 11 is a figure showing transition of the screen of the monitor 1200 which follows transition of the screen shown in drawing 9. The picture state 2040 shown in the figure contains the time zone change button image 2043 for changing the date change button images 2041 and 2042 and the time zone displayed for changing the date forward and backward and 2044 grades.

[0079] A user moves cursor to the date change button image 2041 or the date change button image 2042 to this screen with the cursor advance buttons 1330, 1340, 1350 and 1360 of the remote control 1300A. Program display can be changed by setting it as the day of a request of a day by carrying out the depression of the determination button 1370 choosing the time zone change button images 2043 and 2044 by same operation and setting up a time zone. This is realized when the operation reception

part 1411 performs changing instruction of a picture in the functional execution control part 1413 directly.

[0080] Suppose that cursor was positioned in the position shown by an arrow in the picture state 2040 by operation of the cursor advance buttons 1330 1340 1350 and 1360 of the remote control 1300 and the determination button 1370 was pushed here noting that the user wanted to reserve the drama program \*\*0xx. The operation reception part 1411 which received this user's operation The execution instruction information in the execution control information stored in execution instruction and the equipment-state-information storage parts store 1412 according to the information which the user chose is updated and the picture of the picture state 2050 of drawing 11 is displayed on the monitor 1200 via the functional execution control part 1413.

[0081] If a user chooses a "check" where this picture state 2050 is displayed in response the operation reception part 1411 will be notified to the functional execution control part 1413. The functional execution control part 1413 judges that cancellation was not chosen (Step S105) and judges whether it is the execution instruction of a request-to-print-out-files type function with reference to execution control information (Step S109).

[0082] Since the function of "reservation of picture recording" searching and reserving and "a race card to search" is chosen by the user in this example The functional execution control part 1413 judges it as a request-to-print-out-files type function in Step S109 The execution control information in the execution control information stored in execution instruction and the equipment-state-information storage parts store 1412 is updated to "the waiting for execution" (Step S110) The timing used as the cause which displays an auxiliary menu on the auxiliary menu indication timing control section 1415 is given (Step S111) and it returns to processing of Step S101.

[0083] As a result execution control information is shown in drawing 5. The auxiliary menu indication timing control section 1415 given the timing which serves as a cause which displays an auxiliary menu from the functional execution control part 1413 Directions are issued so that the auxiliary menu item displayed on an auxiliary menu after specified time elapses such as several seconds on the basis of the timing at the auxiliary menu item deciding part 1416 may be determined.

[0084] After receiving directions hereafter so that the auxiliary menu item deciding part 1416 may determine the auxiliary menu item from the auxiliary menu indication timing control section 1415 the operation relevant to the auxiliary menu which the control section 1110 performs

is explained. Drawing 12 is a flow chart which shows the operation relevant to the display of the auxiliary menu by the control section 1110.

[0085]When directions are received so that the auxiliary menu item may be determined from the auxiliary menu indication timing control section 1415the auxiliary menu item deciding part 1416it is required that the state of the present apparatus should be detected in the functional execution control part 1413and the equipment state information (refer to drawing 3) in execution instruction and the equipment-state-information storage parts store 1412 should be updated (Step S201).

[0086]In response to this demandthe functional execution control part 1413 controls each part of the recording playback equipment 1100detects the present state of apparatusand updates equipment state information based on this. After equipment state information is updatedthe auxiliary menu item deciding part 1416The execution control information and equipment state information which are stored in execution instruction and the equipment-state-information storage parts store 1412 are referred toAll the things by which an auxiliary menu item display condition is fulfilled among all the auxiliary menu item information (refer to drawing 6) stored in the auxiliary menu item information storage part 1417 are searched (Step S202).

[0087]The auxiliary menu item deciding part 1416 determines as many auxiliary menu items as possible after search or less by five displayed on an auxiliary menu by referring to the auxiliary menu item priority of auxiliary menu item information (Step S203). The auxiliary menu item deciding part 1416 notifies the information for identifying the determined auxiliary menu item to the auxiliary menu control section 1418after determining the auxiliary menu item. In search of auxiliary menu item information the auxiliary menu item deciding part 1416If there is the information 1 on the purport that the execution instruction information corresponding to conditions is incorporated into auxiliary menu item informationfor example? object(refer to drawing 8)the value of the execution instruction information will also be notified to the auxiliary menu control section 1418.

[0088]When the auxiliary menu item deciding part 1416 is not able to retrieve the auxiliary menu item information that one corresponds in Step S202a notice is not given to the auxiliary menu control section 1418but the processing relevant to an auxiliary menu is ended. In response to the notice from the auxiliary menu item deciding part 1416the auxiliary menu control section 1418 displays the picture of an auxiliary menu via the auxiliary menu indication part 1420 with

reference to the auxiliary menu item information storage part 1417 (Step S204).

[0089] That image data is passed to the outputting part 1170 by the auxiliary menu indication part 1420 and an auxiliary menu is displayed on the monitor 1200 by outputting a television signal to the monitor 1200 from the outputting part 1170. After displaying an auxiliary menu, the auxiliary menu control section 1418A user's operation is received via the auxiliary menu manipulation reception part 1419. According to this control, a cursor advance etc. and a user judges whether one button image displayed on the auxiliary menu was chosen (Step S205). An auxiliary menu will be eliminated if there is no user's operation even if it carries out 10 second passage from the display of an auxiliary menu or movement of cursor (Step S206) (Step S207).

[0090] When a user judges that one button image was chosen to an auxiliary menu (Step S205) and the auxiliary menu control section 1418, execution control information is stored in execution instruction and the equipment-state-information storage parts store 1412 in order to perform the function chosen as the user and based on this the functional execution control part 1413 controls each part of the recording playback equipment 1100 and performs the function (Step S208).

[0091] In Step S208, the auxiliary menu control section 1418, the execution control information is stored in execution instruction and the equipment-state-information storage parts store 1412 using "un-decoding" as execution control information using the auxiliary menu execution instruction information in auxiliary menu item information as execution instruction information on execution control information. Hereafter, it is based on an example and the operation shown in the flow chart of drawing 12 is explained.

[0092] It is assumed that two or more auxiliary menu item information is included in the auxiliary menu item information row shown in drawing 7 and drawing 8 in addition to this at the auxiliary menu item information storage part 1417. In response to directions from the auxiliary menu indication timing control section 1415, the auxiliary menu item deciding part 1416, after requiring the functional execution control part 1413 to detect the state of the present apparatus (Step S201), the inside of execution instruction and the equipment-state-information storage parts store 1412 presupposes that it changed into the state where it is shown in drawing 5.

[0093] This shows the state where the reservation of picture recording of the drama program \*\*0xx is made and it has become the execution waiting of recording. The auxiliary menu item deciding part 1416 after Step

S201Although the auxiliary menu item information that an auxiliary menu item display condition is fulfilled is retrieved (Step S202)by this the auxiliary menu item information shown in drawing 7 is not retrieved in order not to fulfill conditionsbut the auxiliary menu item information shown in drawing 8 is retrieved in order to fulfill conditions.

[0094]After searchby referring to the auxiliary menu item priority of auxiliary menu item informationthe auxiliary menu item deciding part 1416 chooses the auxiliary menu item information to five sequentially from what has a high priorityand notifies it to the auxiliary menu control section 1418. Since the information of "the ? object 1" is in the auxiliary menu item information shown in drawing 8\*0xx .... the time etc. which should be recordedwhich is the objects 1 in the execution instruction information shown in drawing 5 as information corresponding to this is notified to the auxiliary menu control section 1418 from the auxiliary menu item deciding part 1416.

[0095]In response to the notice from the auxiliary menu item deciding part 1416the auxiliary menu control section 1418 displays the picture of an auxiliary menu via the auxiliary menu indication part 1420 (Step S204). As a resultthe screen shown in the picture state 2060 of drawing 13 is displayed on the monitor 1200. Each button image currently displayed on the auxiliary menu corresponds to each auxiliary menu item information determined as the auxiliary menu item deciding part 1416and is displayed from on the auxiliary menu sequentially from the button image corresponding to the high auxiliary menu item information on a priority.

[0096]Drawing 13 is a figure showing transition of the screen displayed on the monitor 1200. Where the screen of the picture state 2060 is displayed on the monitor 1200by operating the button 1380 for auxiliary menu manipulationthe user is moving cursorshifts and can choose that button image. When a user chooses "it is broadcast reservation of picture recording next time" and the drawn button imagethe auxiliary menu control section 1418A user's selection is received via the auxiliary menu manipulation reception part 1419 (Step S205)It uses for the auxiliary menu item information (refer to drawing 8) corresponding to the button image which the user choseand the functional execution control part 1413 is made to perform a function by storing execution control information in execution instruction and the equipment-state-information storage parts store 1412 (Step S208).

[0097]The execution control information stored in execution instruction and the equipment-state-information storage parts store 1412 here makes what transposed the "? object 1" of the auxiliary menu execution



instruction information shown in drawing 8 to "\*\*0xx .... the time etc. which should be recorded" execution instruction information and becomes what made it execution control information "to un-decode." In response the functional execution control part 1413 performs operation shown in the flow chart of drawing 10.

[0098] That is the functional execution control part 1413 judges [ "not having decoded" and ] execution control information paying attention to the above-mentioned execution control information (Step S101) (Step S102) judges that there is a subcommand (Step S107) and executes a subcommand (Step S108). As a result the setting out 1 in execution control information by execution of getmode to "high definition." As for the object 2 the object 1 is updated by the information concerning [ concerning "the disk 1" by execution of getdisk (default) ] drama \*\*0xx for next time by execution of search ("\*\*0xx .... the time etc. which should be recorded" EPGNEXT).

[0099] The functional execution control part 1413 after execution of a subcommand it judges whether a user's directions are required (Step S103) and since the further information is not needed from a user since the value is given to the setting out 1 but a major item is "reservation of picture recording" it supposes that it is judged that a check is required and a confirmation screen is displayed here (Step S104). As a result the screen shown in the picture state 2070 of drawing 13 is displayed on the monitor 1200.

[0100] Since the operation after Step S104 of the functional execution control part 1413 is the same as the operation after the monitor 1200 displayed the picture state 2050 of drawing 11 mentioned above explanation is omitted. When time advances and recording comes to be performed about the reservation of picture recording of the drama program mentioned above the functional execution control part 1413 makes affirmative judgment in Step S112 of the flow chart of drawing 10 The execution control information in execution control information is updated "during execution" (Step S113) After performing a recording function (Step S114) execution control information is made "finishing [ execution ]" (Step S115) and the timing which serves as a cause of an auxiliary menu indication at the auxiliary menu indication timing control section 1415 is given (Step S116).

[0101] After a user plays the drama program it became finishing recording by operation of a basic menu etc. supposing the empty disk storage capacity of the Records Department 1120 is less than 2 GByte in order that the auxiliary menu item information shown in drawing 7 may fulfill conditions deletion of a reproduced file and the drawn button image are

displayed on an auxiliary menu.

[0102]Usually the button image "deletion of a reproduced file" which is not displayed if a user does not perform operation to a basic menu several times will be automatically displayed after (refer to drawing 4) and reproduction of a drama program. Thus the digital broadcasting receiving system 1000 Based on the state of operation of a user's past and the present apparatus the function which the user probably wants to use by the auxiliary menu item deciding part 1416 for the predetermined timing to which the users at the time of the execution completion of a function etc. probably want to perform the next operation is searched Since the selection menu of the function is displayed the user can do directions of execution of the function only by choosing the function from a menu.

[0103]Namely the digital broadcasting receiving system 1000 predicts the function for which a user asks and provides it spontaneously without waiting for a user to demand the graphical user interface for making a user do execution instruction of a function.

Below <Embodiment 2> explains the user interface apparatus concerning the embodiment of the invention 2 using drawing 22 from drawing 14.

[0104]<Composition> drawing 14 is a lineblock diagram of the digital broadcasting receiving system 3000 provided with the user interface apparatus concerning the embodiment of the invention 2. Although the digital broadcasting receiving system 3000 is the same as the digital broadcasting receiving system 1000 shown in Embodiment 1 almost it is a point provided with the control section 3110 which has a function of different user interface control from the control section 1110 mentioned above and differs from the digital broadcasting receiving system 1000.

[0105]Here among the figures since the portion which attached the same numerals as the digital broadcasting receiving system 1000 (refer to drawing 1) of Embodiment 1 is a component provided with an equivalent function it omits the functional description. The recording playback equipment 1100 shown in Embodiment 1 except for the point which replaces the digital broadcasting receiving system 3000 with the control section 1110 and contains the control section 3110 and the equivalent recording playback equipment 3100 It is constituted by the monitor 1200 which displays a picture and the remote control 1300 which receives user's operation and tells the recording playback equipment 1100.

[0106]The recording playback equipment 3100 is provided with the following.

Detect the signal sent out from the remote control 1300 based on user's operation and it corresponds to this user's operation The function to

receive and record the program of digital broadcastingthe function which plays the recorded programetc. are performedthe picture for displaying the reproduced image of a program and the menu for a selection of function is outputted to the monitor 1200and it is the control section 3110.

Records Department 1120.

Broadcast receiving antenna 1130.

The receive section 1140the coding part 1150the regenerating section 1160and the outputting part 1170.

[0107]Herethe control section 3110 has CPUand a memory and other storage parts storethe execution control function which controls operation of each part of the recording playback equipment 1100 is realized according to the signal sent out from the remote control 1300and the program for such control is stored in the storage parts store. The control section 3110 realizes a user interface control facilityand it passes the picture of a menu to the outputting part 1170 in order to display the menu which is a graphical user interface for making a user choose a function on the monitor 1200.

[0108]Herea menu comprises two or more button images and cursorand a basic menu with a fixed hierarchy and the auxiliary menu displayed when the auxiliary determination button 1381 of the remote control 1300 is pushed by the user are contained in this menu. Howeveran auxiliary menu [ in / it differs in Embodiment 1 and / Embodiment 2 ]Two or more keywords relevant to each function of the recording playback equipment 3100 are displayed as a selectable button imageand the button image where each function of the recording playback equipment 3100 chooses directly further according to a user's selection operation to it is displayed. The button image for changing the display of a keyword is also added to an auxiliary menu.

[0109]The button 1380 for auxiliary menu manipulation of the remote control 1300 is unchanging with the contents shown in Embodiment 1 about the point which is a button for exclusive use for operating this auxiliary menu. Hereafterthe functional constitution of the control section 3110 which realizes an execution control function and a user interface control facility is explained.

[0110]Drawing 15 is a functional block diagram of the control section 3110. The execution control function and user interface control facility of the control section 3110The operation reception part 141land execution instruction and an equipment-state-information storage parts store 1412The functional execution control part 1413the image data

memory section 3414 and the auxiliary menu indication control information storage section 3417. The auxiliary menu control section 3418 which bears the role which replaces the auxiliary menu control section 1418 in Embodiment 1, the auxiliary menu manipulation reception part 3419 and the auxiliary menu indication part 3420 are realized.

[0111] The thing equivalent to the function processing part of the control section 1110 in Embodiment 1 attaches the same numerals as having used by Embodiment 1 about each function processing part of the control section 3110 shown in the figure (refer to drawing 2) and the explanation about these is omitted. The image data memory section 3414 has memorized beforehand the image data for displaying the screen for receiving setup information required in order to perform a basic menu an auxiliary menu and a function from a user.

[0112] A picture required in order to display an auxiliary menu on the monitor 1200 in response to directions of the auxiliary menu control section 3418 is acquired by referring to the image data memory section 3414 and the auxiliary menu indication part 3420 passes it to the outputting part 1170. The auxiliary menu manipulation reception part 3419 detects operation of the button 1380 for auxiliary menu manipulation by a user and tells the auxiliary menu control section 3418.

[0113] The auxiliary menu control section 3418 determines the function item name of the recording playback equipment 3100 which should be displayed as the keyword which should be displayed and receives the auxiliary menu indication part 3420. Directions are issued so that the button image describing a keyword, the button image which drew the function item name of the recording playback equipment 3100 if needed and the included auxiliary menu may be displayed.

[0114] Based on operation by the user to whom the auxiliary menu control section 3418 was told from the auxiliary menu manipulation reception part 3419, directions of the purport that cursor is moved are taken out to the auxiliary menu indication part 3420 and if operation by a user is selection of the button image in an auxiliary menu according to the operation execution instruction of the function specified by change of the display information of an auxiliary menu or the user will be performed.

[0115] Namely, the renewal of the display of a function item when a keyword is chosen by the user as for the auxiliary menu control section 3418. Execution control information is stored in execution instruction and the equipment-state-information storage parts store 1412 in order to make the functional execution control part 1413 perform the function when change of a keyword is chosen and renewal of the display of a keyword

and a function item are chosen.

[0116]Drawing 16 is a figure showing transition of the auxiliary menu displayed on some monitors 1200. The keyword button image group 4011 which the auxiliary menu state 4010 shows the state of the auxiliary menu displayed first if the button 1380 for auxiliary menu manipulation is operated by the user and drew the keyword-- others -- word display and the keyword change button image 4012 which drew are included.

[0117]The auxiliary menu state 4020The state of the auxiliary menu displayed when the auxiliary cursor advance buttons 1382 and 1383 in the button 1380 for auxiliary menu manipulation were pushed on the user and the auxiliary determination button 1381 is pushed after cursor was regarded as the "request to print out files" by the drawn keyword button image. It is shown and in addition to the auxiliary menu state 4010the feature button image group 4021 which is a set of the button image in which the name of the function was drawn is included.

[0118]Therefore if one button image in the feature button image group 4021 is chosen by the user the auxiliary menu control section 3418If the execution control information for performing the function corresponding to the button image is stored in execution instruction and the equipment-state-information storage parts store 1412 and one button image in the keyword button image group 4011 is chosen by the userThe button image about the function relevant to the keyword is determinedthe feature button image group 4021 is updated and the determined button image is displayed.

[0119]Here the data memorized to the auxiliary menu indication control information storage section 3417 is explained. Drawing 17 is a figure showing the data which the auxiliary menu indication control information storage section 3417 memorizes. As shown in the figure the auxiliary menu indication control information storage section 3417The function item information 3510 which is information about the function item displayed on an auxiliary menu as the feature button image group 4021 PluralityThe keyword information 3520 which is information about the keyword displayed on an auxiliary menu as the keyword button image group 4011 PluralityThe semantic relation information 3530 which is information about the semantic relations of a function item and a keywordIt has a field for memorizing the function item and the keyword state information 3540 used as the foundation for judging whether it should be displayed as an auxiliary menu about a function item and a keyword in addition storing a value required for calculation of the auxiliary menu control section 3418.

[0120]In these information a function item and keyword state

informationIt is the information which the auxiliary menu control section 3418 updates according to a user's operation and other function item information 3510keyword information 3520and semantic relation information 3530 are beforehand memorized by the auxiliary menu indication control information storage section 3417and updating is information which is not carried out. The function item information 3510 comprises a number a function item nameand function item execution instruction informationand exists for every function which a user is made to choose with an auxiliary menuandas for the numberconsecutive numbers are assigned from 0 for every function.

[0121]Herefunction item execution instruction information is the execution instruction information explained by Embodiment land information on the same form. Drawing 18 is a figure which illustrates the list of the number of the function item information 3510and function item names. The keyword information 3520 is information which comprises a number and a keywordand only the number of keywords exists. A number follows the function item information 3510consecutive numbers are assigned hereand the maximum of a number will be set to  $N+M$ —supposing it will have a value of more than No.  $N$  and  $M$  keywords existif the total of the function item information 3510 is set to  $N$ .

[0122]Here $N$  sets to 47 and  $M$  is set to 62. Drawing 19 is a figure which illustrates the number of the keyword information 3520and the list of keywords. As shown in the figurea keyword is the character string defined by the viewpoint which can find easily the function which a user wants to choose.

[0123]The semantic relation information 3530 is information which shows which and which are the function item information 3510 or the keyword information 3520 which are semantically related directlywhen the function item information 3510 and the keyword information 3520 are expressed with consecutive numbers and these one is chosen. One function item or a keyword has semantic relation directly with at least one of a function item or keywords. Thereforeone keyword has semantic relation directly or indirectly with at least one of the function items. that a keyword has semantic relation in a function item and an indirect targetIt says having a semantic relation by passing other keywordsfor exampleanother keyword in which a keyword has semantic relations directly -- a function item -- direct -- semantic relations -- suddenly -- or -- the another keyword has semantic relations directly -- it says that another keyword to a pan has semantic relations in a function item directly.

[0124]Although an example of the semantic relation information 3530 was

shown in drawing 17 Consider it as the number of function items with N pieces consider it as the number of keywords with M pieces and in the numbers from 0 to N+M-1 which is consecutive numbers. If a function item and a keyword are shown and there is a relation with as semantic function item or keyword of a certain sequence (j sequence) as the function item of a certain line (i line) or a keyword according to the related degree dignity is given to the element of an i line j sequence. All dignity is set to 1 in the example of the figure.

[0125] For example if the example of drawing 17 pays its attention to the keyword of number N+M-1 it is shown that the function item of the number 3 is related to this. The keyword or function item by the side of [ by which its attention is paid to the semantic relation information 3530 ] primary It is what shows the keyword of the secondary it is supposed that there are semantic relations in view of the primary side to which its attention is paid or a relation with a function item For example when the keyword a "request to print out files" is carried out a primary side and the function item of "setting out of recording image quality" is made into a secondary Though it is related when it carries out the function item of "setting out of recording image quality" a primary side and the keyword a "request to print out files" is made into a secondary it is the information carried out [ that it can be said that it is unrelated and ].

[0126] Below <operation> explains operation of the digital broadcasting receiving system 3000 provided with above-mentioned composition. The recording playback equipment 3100 performs recording playback etc. of digital broadcasting under control of the control section 3110.

[0127] The recording operation and reproduction motion of the recording playback equipment 3100 are equivalent to operation of the recording playback equipment 1100 fundamentally shown in Embodiment 1. The control section 3110 by displaying the screen for user inputs following a basic menu or this An auxiliary menu is displayed when receive a user's directions and each functions such as recording and playback is performed according to this and also one portion of the buttons 1380 for auxiliary menu manipulation of the remote control 1300 is pushed by the user A user is provided with the user interface for making a desired function choose separately from a hierarchical menu like a basic menu.

[0128] Hereafter in response to operation of the button 1380 for auxiliary menu manipulation by a user operation of the digital broadcasting receiving system 3000 is explained in detail focusing on operation of the auxiliary menu control section 3418 which controls a display updating etc. of an auxiliary menu. Drawing 20 is a flow chart which shows operation of the auxiliary menu control section 3418. If the

notice with operation of the button 1380 for auxiliary menu manipulation of the remote control 1300 by a user is received from the auxiliary menu manipulation reception part 3419 the auxiliary menu control section 3418. By judging that it is in the state which does not show the present auxiliary menu it is got to know whether initialization is required (Step S401).

[0129] Namely if one button of the buttons 1380 for auxiliary menu manipulation is pushed by the user in the state where the auxiliary menu is not displayed the auxiliary menu control section 3418. This is recognized to be the beginning of the operation about a series of auxiliary menus (Step S401) and the function item and keyword state information of the auxiliary menu indication control information storage section 3417 are initialized (Step S402).

[0130] Here renewal of a function item and keyword state information is explained. Drawing 21 is a figure showing the principle of the updating operation of a function item and keyword state information. The nodes 301302303304...311 which are the storage areas for the state maintenance shown in the figure are equivalent to what is called a variable in a computer program and correspond to the function item and keyword state information memorized by the auxiliary menu indication control information storage section 3417.

[0131] The arrow which goes to node 301 grade shows the input of the evaluation value to the node 301 grade and  $I[0]I[1]...I[N+M-1]$  are predetermined evaluation values inputted according to a user's operation. Later output [ from node 301 grade ]  $V[0]V[1]...V[N+M-1]$  smear away becoming an input of node 301 grade on the intersection of a line and show it by the seal of the rectangular head. The seal of this continuous tone rectangular head supports the contents of the semantic relation information 3530 shown in drawing 17 and the auxiliary menu control section 3418 performs updating operation of a function item and keyword state information referring to the semantic relation information 3530. However in order to perform operation which considers the output value from node 301 grade as the input to node 301 grade based on the control procedure defined beforehand it is not repeated to infinity.

[0132] It means that the user is interested in the function item or keyword corresponding to the node so that the evaluation value which a node holds is large. Here that the user is interested means that it is related to a function item [ that a user hopes to perform ]. If the element of the  $i$  line  $j$  sequence in the semantic relation information 3530 is made into  $T[i][j]$  input  $Vin[i]$  to the  $i$ -th node will become like several 1 (refer to drawing 21).



[One number]  $Vin[i] = \sum_{j=0}^{N+M-1} (T[i][j] V[j]) + I[i]$  (total from  $\sum_{j=0}^{N+M-1}$ )

here -- the node 301 -- the 0th node 302 -- the 1st -- as -- giving a number to a node in order -- the i-th node -- as -- it calls. The i-th node corresponds with that whose number in the information is i among function item information or keyword information.

[0133] When a user chooses a keyword the auxiliary menu control section 3418 making into a positive predetermined value the evaluation value which will be made into  $I[i]$  if the node corresponding to the keyword is the i-th thing -- a user -- "others -- when word display" is chosen  $I[i]$  corresponding to the keyword and function item which were then displayed is taken as a negative predetermined value.

[0134] The relation between the value inputted into the node 301 grade and the value outputted from node 301 grade after the input becomes like [ nodes / the 0th corresponding to function item to / N-1st ] several 2 and becomes like several 3 about the Nth corresponding to a keyword to  $N+M-1$  position node.

[Two number]  $V[i] = OUT\_LEVEL1$  (in the case of  $Vin[i] > LEVEL1$ )

$V[i] = 0$  (in the case of  $Vin[i] \leq LEVEL1$ )

[Three number]  $V[i] = OUT\_LEVEL1 + I[i]$  (in the case of  $Vin[i] > LEVEL2$ )

$V[i] = 0$  (in the case of  $Vin[i] \leq LEVEL2$ )

Several 2 and  $OUT\_LEVEL1$  in several 3 are values defined beforehand and they are thresholds as which  $LEVEL1$  and  $LEVEL2$  are determined beforehand.

[0135] If one keyword is chosen as a user a positive evaluation value will be inputted into the node corresponding to this keyword and the input value to the node corresponding to the function item or keyword behind connected by the output of that node for the semantic relation information 3530 will increase. The output increases about what exceeded the threshold among the nodes which the input value increased and when control which gives the output as an input once again is performed the input value of the node and node with semantic relations is made to increase.

[0136] Therefore selection of a keyword will spread the increase in the input value over the function item relevant to it in the function item far from the near function item of semantic distance according to repeating execution of the control which considers the output from a node as the input to a node. Incidentally this can be called operation near the associative process of the concept based on the activated diffusion theory of semantic processing said with psychology. This activated diffusion theory is explained to "the cognitive psychology important research collection two-volume memory cognitive (Seishin

Shobo) important research 2-4 "activated diffusion theory of semantic processing" (64 pages - 67 pages)"for example.

[0137]Againit returns to explanation of the operation shown in the flow chart of drawing 20. The auxiliary menu control section 3418 initializes to 0 the evaluation value which each node which is a function item and the keyword state information 3540 holds (Step S402). The auxiliary menu control section 3418 performs after initialization display key word determination processing for asking for the keyword which should be displayed on an auxiliary menu (Step S403). This display key word determination processing is mentioned later.

[0138]After display key word determination processingthe auxiliary menu control section 3418two or more button images in which two or more determined keywords were drawn -- "others -- the auxiliary menu containing word display" and the drawn button image is displayed on the monitor 1200 via the auxiliary menu indication part 3420 (Step S404). As a resultthe auxiliary menu of the auxiliary menu state 4010 shown in drawing 16 will be displayed on some monitors 1200.

[0139]moreover -- "others -- when word display" and the drawn button image are chosen by the user(Step S405) and the auxiliary menu control section 3418A negative evaluation value is inputted into the node corresponding to the function item and keyword which are displayed nowthe value which each node holds is updated (Step S406)and display key word determination processing is performed (Step S403).

[0140]When the button image in which the keyword was drawn is chosen by the user(Step S407) and the auxiliary menu control section 3418A positive evaluation value is inputted into the node corresponding to a keyword with the selected userthe value which each node holds is updated (Step S408)and the function item which should be displayed on an auxiliary menu is determined (Step S409).

[0141]The determination of the function item which should be displayed on an auxiliary menu is considering it as the function item which should choose six sequentially from what has an evaluation value high among the nodes corresponding to a function itemand should display the function item corresponding to these on an auxiliary menu. The auxiliary menu control section 3418 performs display key word determination processingalso after determining the function item which should be displayed on an auxiliary menu (Step S409) (Step S403).

[0142]When a function item is chosen by the userWith reference to the function item execution instruction information on the function item information 3510 corresponding to the selected function itemthe auxiliary menu control section 3418 by storing execution control

information in execution instruction and the equipment-state-information storage parts store 1412It points to execution of the selected function (Step S410)and the control relevant to an auxiliary menu is ended.

[0143]The point that the functional execution control part 1413 will perform a function based on it if execution control information is stored in execution instruction and the equipment-state-information storage parts store 1412 is the same with having been shown in Embodiment 1. Hereafterthe display key word determination processing (S403) which the auxiliary menu control section 3418 performs is explained in detail using drawing 22.

[0144]Drawing 22 is a flow chart which shows the display key word determination processing which the auxiliary menu control section 3418 performs. As display key word determination processingthe auxiliary menu control section 3418Firstset to 1 the variable k which is the turn which should be displayed (Step S501)and the evaluation value of each node which is a function item and the keyword state information 3540 is referred toIt asks for the keyword semantically connected with a number nearest to the half of the number of all the function items with which the evaluation value is higher than threshold LEVEL1 of function itemsand determines as a keyword displayed on an auxiliary menu the 1st (Step S502).

[0145]Herebeing related semantically is that the output of the node corresponding to the keyword has a relation used as the input of a function item (refer to drawing 17 and drawing 21). After asking for the keyword displayed on the 1stthe auxiliary menu control section 3418 removes the function item semantically connected with the keyword from a calculation object (Step S503). Herea calculation object means the object of the calculation which asks for the keyword in the next step S506.

[0146]The auxiliary menu control section 3418 judges whether the number of the function items which increase the variable k one time (Step S504)and serve as the present calculation object is one or moreand the variable k is less than five after Step S503 (Step S505). When affirmative judgment is made in Step S505The auxiliary menu control section 3418 asks for the keyword semantically connected with the largest number of the function item used as the present calculation objectIt determines as a keyword displayed on the k-th (Step S506)and returns from a calculation object to processing of Step S503 except the function item semantically connected with the keyword further.

[0147]Thereforewhile negative judgment is not made in Step S505processing of Step S506S503and S504 will be repeatedand the keyword

which displays only the part to have been repeated will be called for. When negative judgment is made in Step S505The auxiliary menu control sections 3418 are keywords other than the keyword displayed on the 1stask for the keyword semantically connected with the largest number of the function item semantically connected with the keyword displayed on the 1stand determine it as a keyword displayed at the end (Step S507). [0148]Thus the auxiliary menu control section 3418 determines all the keywords which should be displayed. Hereafter the example of a user's operation is mixed and operation of the auxiliary menu control section 3418 is explained concretely. When one button of the buttons 1380 for auxiliary menu manipulation of the remote control 1300 is pushed in the state where the auxiliary menu is not displayed by the userThe remote control 1300 sends out the signal which notifies thatand the auxiliary menu manipulation reception part 3419 of the control section 3110 detects thisand it notifies it to the auxiliary menu control section 3418.

[0149]In response the auxiliary menu control section 3418 displays the auxiliary menu used as the auxiliary menu state 4010 shown in drawing 16 on some monitors 1200 via the auxiliary menu indication part 3420 (Step S401S402S403S404). Namely the image data stored in the image data memory section 3414 is used for the auxiliary menu indication part 3420The picture which should display an auxiliary menu on the outputting part 1170 is passedin response the outputting part 1170 outputs a television signal to the monitor 1200and the auxiliary menu of the state of the auxiliary menu state 4010 is displayed on some monitors 1200.

[0150]The picture currently then displayed on the monitor 1200 is displayed on other portions excluding the portion as which the auxiliary menu in the monitor 1200 was displayed as it is. For example the basic menu is displayed if a user is operating a basic menu. Whenever the auxiliary cursor advance button 1383 of the remote control 1300 is pushed by the user in this state the auxiliary menu control section 3418 the cursor displayed on the monitor 1200 -- "recording" system construction situation confirmation failure worries and a trouble and a "request to print out files" -- " -- others -- word display" -- again -- "recording" -- as -- it moves cyclically and if the auxiliary cursor advance button 1382 is pushed it will move to a reverse order.

[0151]Since operation of the user to this auxiliary menu is what is performed with the button 1380 for auxiliary menu manipulation of the remote control 1300 the user can perform other operations in parallel to operation of an auxiliary menu by carrying out the depression of other remote control buttons of the remote control 1300. if a user judges that

the keyword associated with the function considered as a request of it is not displayed on an auxiliary menu now -- "others -- word display" is chosen. As a result a new keyword is displayed by the auxiliary menu control section 3418 (Step S401S405S406S403S404).

[0152] in the state of the auxiliary menu state 4010 -- a user -- "others -- word display" -- not but when cursor is positioned in a "request to print out files" and the auxiliary determination button 1381 of the remote control 1300 is pushed the auxiliary menu control section 3418 processes in order of Step S401S405S407S408S409S403 and S404 (refer to drawing 20).

[0153] Namely when the auxiliary menu control section 3418 inputs a positive predetermined value into the node corresponding to a "request to print out files" which is the keyword chosen as the user The evaluation value which the node corresponding to the function item or keyword which does calculation shown in several 1 - a three number and is semantically connected with a "request to print out files" as a result holds increases (Step S408). Following Step S408 the auxiliary menu control section 3418 chooses six of the nodes in which this evaluation value increased from the one where an evaluation value is higher and the function item corresponding to this node is determined (Step S409) Display key word determination processing is performed after that (refer to Step S403 and drawing 22) and an auxiliary menu is updated via the auxiliary menu indication part 3420 that the keyword and function item which were determined with reference to the function item information 3510 and the keyword information 3520 should be displayed (Step S404).

[0154] As a result the auxiliary menu displayed becomes like the auxiliary menu state 4020. Whenever the auxiliary cursor advance button 1383 of the remote control 1300 is pushed by the user in this state the auxiliary menu control section 3418 The cursor displayed on the monitor 1200 "Timed recording is made according to genre, cancellation of a request to print out files" a reservation status check the timed recording from a race card disk situation confirmation setting out of recording image quality and the keyword button image group 4011 -- "others -- word display" -- again -- "making timed recording according to genre" -- as -- it moves cyclically. In the keyword button image group 4011 cursor is moved downward from a top. If the auxiliary cursor advance button 1382 is pushed it will move to a reverse order.

[0155] When a user chooses the button image of either of the feature button image groups 4021 in this state the auxiliary menu control section 3418 With reference to the function item information 3510 the execution

control information for performing the function item corresponding to the button image is stored in execution instruction and the equipment-state-information storage parts store 1412 (Step S410) an auxiliary menu is changed into a non-display state and the control relevant to an auxiliary menu is ended.

[0156] When a user chooses "search" of the keyword button image groups 401 and the drawn button image in the state of the auxiliary menu state 402, the auxiliary menu control section 3418. The order of Step S401, S405, S407, S408, S409, S403 and S404 will be processed again. Thus, when a keyword is chosen by the user over several times, those the selections of all will be utilized in the determination of the function item displayed on an auxiliary menu. Therefore, if a user chooses a keyword rather than specifies functional operation directly, the recording playback equipment 1100 will specify the functional operation for which the user will ask based on the keyword concerned and will display the feature button image group 402.1. That is, it can be said that the recording playback equipment 1100 is a device which predicts the functional operation for which the user will ask and provides a user interface.

Providing a user interface like the auxiliary menu in <Embodiment 3> embodiment 1 which displays the button which does not necessarily have the necessity for selection and by so to speak indicating by recommendation (recommendation). Although apparatus is enabled to provide a function convenient for a user abundantly intelligibly for a user. Embodiment 3 shows the example which indicates the function which cannot be displayed as a usual systematic menu by recommendation at the time of necessity. A recommendation display here has a meaning which predicts and indicates that it specifies and displays the functional operation which is not directly directed by the user, i.e. the functional operation for which the user will ask.

[0157] Hereafter, the user interface apparatus concerning the embodiment of the invention 3 is explained using drawing 26 from drawing 23. <Composition> drawing 23 is a line block diagram of the digital broadcasting receiving system 5000 provided with the user interface apparatus concerning the embodiment of the invention 3.

[0158] The digital broadcasting receiving system 5000 is constituted by the digital broadcasting receiving set 5100, the monitor 5200 which displays a picture and outputs a sound, and the remote control 5300 which receives user's operation and tells the digital broadcasting receiving set 5100. The digital broadcasting receiving set 5100 is provided with the following.

Have an infrared light sensing portion, this detects the signal sent out

from the remote control 5300 based on user's operation and it corresponds to this user's operation. The function etc. which receive the program of digital broadcasting and are outputted to a monitor are performed. The picture for displaying the button for functional execution instruction which is a graphical user interface is further outputted to the monitor 5200 and it is the broadcast receiving antenna 5101.

Receive section 5110.

Recording part 5120.

the regenerating section 5130, the outputting part 5140, the control section 5150 and a time check — the time check which has a function — the part 5160.

[0159] The control section 5150 has CPU and a memory and other storage parts. It stores here the signal sent out from the remote control 5300 and a time check — based on the time information sent from the part 5160. The execution control function which controls operation of each part of the receive section 5110, the recording part 5120, regenerating section 5130, grade and the digital broadcasting receiving set 5100 is realized and the program for such control is stored in the storage parts store.

[0160] For example, the control section 5150 controls record etc. of receiving the information on a race card among the information which the receive section 5110 received or making the receive section 5110 receive the program of the channel directed to the user and a program viewing history. Here the race card is the same as that of what was explained in Embodiment 1. The control section 5150 realizes a user interface control facility and outputs graphical user interface pictures such as a button image for making a user do run designation of a function to the monitor 5200.

[0161] Including a tuner, the system stream decoder of MPEG etc., the receive section 5110 receives a digital broadcasting program and gets over via the broadcast receiving antenna 5101 and packet separation of the program according to a user's directions is carried out. The separated program data can be transmitted to the regenerating section 5130 or the recording part 5120 and in addition to reception of various programs a race card can also be received.

[0162] The recording part 5120 has a hard disk or DVD-RAM and records the program data transmitted from the receive section 5110 on a hard disk, DVD-RAM etc. The regenerating section 5130 gives the data for elongating the program data transmitted from the receive section 5110 including the image and audio decoder of MPEG and displaying a picture and the data for voice response to the outputting part 5140.

[0163]The outputting part 5140 will be outputted to the monitor 5200 with the data for voice response which compounded these if needed and was given from the regenerating section 5130 as a television signal if the data for displaying a picture from the regenerating section 5130 and the control section 5150 is given. In order that the remote control 5300 may perform operation to the graphical user interface picture displayed on the monitor 5200The signal for identifying a determination button and the button pushed on the digital broadcasting receiving set 5100 when it had a cursor advance button etc. and one of buttons was pushed on a user is sent out. Herea determination button is a button corresponding to operation of pushing the button image displayed on the monitor 5200.

[0164]Hereafterthe functional constitution of the control section 5150 which realizes an execution control function and a user interface control facility is explained. Drawing 24 is a functional block diagram of the control section 5150. The execution control function and user interface control facility of the control section 5150The function control part 5151the user input reception part 5152each part control section 5153 of apparatusthe equipment-state-information storage 5154the time-of-day-control department 5155the GUI control section 5156and the program information storage 5157 realize.

[0165]The function control part 5151 by making each part control section 5153 of apparatus control each part of the digital broadcasting receiving set 5100 of the receive section 5110 and regenerating section 5130 gradeA race card is made to incorporate for every hourthe function corresponding to a user's directions is performedand a button image is displayed on the GUI control section 5156 if needed using the time-of-day-control department 5155 with reference to the equipment-state-information storage 5154 and the program information storage 5157. For these reasonsthe function control part 5151 decodes a user's directions received by the user input reception part 5152and takes out directions to each part control-section of apparatus 5153 grade based on this.

[0166]The race card incorporated by the function control part 5151 is stored in the program information storage 5157. The function control part 5151 cancels the race card incorporated beforewhen incorporating a new race card. The function control part 5151 has the function to search the program by which predetermined conditions are fulfilled from a race card. The GUI control section 5156 creates the button image which receives directions of the function control part 5151 and displays the character string specifiedand displays it on the monitor 5200 via the outputting part 5140.

[0167]The user input reception part 5152 is what receives user's



operation and is told to the function control part 5151 by detecting the signal sent out from the remote control 5300. When the button image is shown on the monitor 5200 by the GUI control section 5156, user's operation called specification or the cursor advance of a button image is received. In response to directions of the function control part 5151, each part control section 5153 of apparatus controls the receive section 5110 and regenerating section 5130. It performs various operations and stores the executed situation of various operations, the state of each part, etc. in the equipment-state-information storage 5154. Therefore, the information about the run state, etc. of each part, such as a channel number received now, is stored in the equipment-state-information storage 5154.

[0168] The time-of-day-control department 5155 — a time check — with reference to the time information spent from the part 5160, the passage of time specified as the function control part 5151 is notified, or time information is given to the function control part 5151.

Below <operation> explains operation of the digital broadcasting receiving system 5000 provided with above-mentioned composition.

[0169] The digital broadcasting receiving set 5100 performs reception of a digital broadcasting program, etc. under control of the control section 5150. Operation of the program reception by the digital broadcasting receiving set 5100: Receive the electric wave which information including a program, etc. multiplexed and was broadcast by the receive section 5110 via the broadcast receiving antenna 5101, and the information on a required program is extracted. The image and audio information of a program are elongated by the regenerating section 5130, and it is carried out by outputting a television signal to the monitor 5200 through the outputting part 5140.

[0170] Although the control section 5150 controls the digital broadcasting receiving set 5100 according to user's operation and reception of the program of the channel specified as the user is enabled. If the control section 5150 passes after a channel change for 1 minute when a user operates the channel change to the CM time under program viewing and listening, etc. and is viewing and listening to other programs further, it is what also realizes the function which displays the button image for returning a channel to the program to which it was viewing and listening first on the monitor 5200. The processing and the timer time progress processing for a recommendation display corresponding to program switching control which are the following: therefore the processing which the function control part 5151 performs, and the timer time progress processing for viewing-and-listening

decision detection are explained.

[0171] Drawing 25 is a flow chart which shows the processing corresponding to the program switching control which the function control part 5151 performs the timer time progress processing for a recommendation display and the timer time progress processing for viewing-and-listening decision detection. The function control part 5151 specifies time as the time-of-day-control department 5155 and these processings make the progress notify. Namely, use the time-of-day-control department 5155 as a logical timer and the processing corresponding to program switching control. It is the processing made when it is detected that the user operated the channel change by the function control part 5151 and the procedure of setting up two logical timers: the timer for a recommendation display and the timer for viewing-and-listening decision is included.

[0172] The timer time progress processing for a recommendation display. It is the processing made by the function control part 5151 which received the notice from the time-of-day-control department 5155 at the time of the passage of time set as the timer for a recommendation display. The timer time progress processing for viewing-and-listening decision detection is processing made by the function control part 5151 which received the notice from the time-of-day-control department 5155 at the time of the passage of time set as the timer for viewing-and-listening decision detection.

[0173] When a user detects having operated the channel change first, the function control part 5151 makes the timer for viewing-and-listening decision detection stop (Step S5501) and judges whether a viewing-and-listening decision flag is ON (Step S5502). When the channel to which it views and listens after that in the meaning that the viewing-and-listening state was become final and conclusive when it continued for 10 minutes and views and listened to the program of the channel with which a viewing-and-listening decision flag has a user here and by which it is turned ON is changed, it is 1-bit data turned OFF.

[0174] In the judgment step S5502 when it is ON a viewing-and-listening decision flag, the function control part 5151 clears a viewing-and-listening decision flag (Step S5503). The contents of the button image which should be displayed on the monitor 5200 are determined (Step S5504). 1 minute is set to the timer for a recommendation display, a timer is started (Step S5505). 10 minutes is set to the timer for viewing-and-listening decision detection and a timer is started (Step S5506). The contents of the button image determined are included with the program name of the origin to which he was viewing and listening and which the

user continued 10 minutes or more and the reason for having displayed the button image. Here the original program name is held in Step S5523 mentioned later.

[0175] For example, the user is viewing and listening to 00 movie 10 minutes or more and if it is a case where a channel change is operated at the time of CM, the contents of the button image will serve as the character string of "returning to 00 movie (1-minute progress)." Since this carried out the channel change and passed for 1 minute and it may forget that the user was seeing 00 movie, it calls attention and it shows that the button image concerned is a graphical user interface for returning a channel to 00 movie.

[0176] In the judgment step S5502, when a viewing-and-listening decision flag is OFF, the function control part 5151 skips Steps S5503-S5505, sets 10 minutes to the timer for viewing-and-listening decision detection and starts a timer (Step S5506). The function control part 5151, after the set of the timer for viewing-and-listening decision detection, takes out directions to each part control section 5153 of apparatus, makes the channel received to the receive section 5110 changed corresponding to a user's channel switching control, other programs are made to receive (Step S5506) and the processing corresponding to a user's channel switching control is ended. If channel switching control is made by the user, the function control part 5151 will perform again processing corresponding to the program switching control mentioned above.

[0177] Then, when 1 minute has passed since the set to the timer for a recommendation display in Step S5505, in response to a notice from the time-of-day-control department 5155, the function control part 5151, the GUI control section 5156 is made to create the button image which performs timer time progress processing for a recommendation display and displays the character string mentioned above of "returning to 00 movie (1-minute progress)." The monitor 5200 is made to display namely recommendation display the button image concerned via the outputting part 5140 (Step S5511).

[0178] When 10 minutes have passed since the set to the timer for viewing-and-listening decision detection in Step S5506, in response to a notice, the function control part 5151 performs timer time detection processing for viewing-and-listening decision detection from the time-of-day-control department 5155. That is, when the above-mentioned recommendation display is made, the recommendation display is canceled (Step S5521), a viewing-and-listening decision flag is set (Step S5522) and the information on the program which carried out viewing-and-listening decision is held (Step S5523). Here, the program which carried out

viewing-and-listening decision being a program of the channel received by the receive section 5110 and holding the information on the program concerned. It says acquiring and holding the program name of the program under reception by referring to the information on the channel number received now it stored in the equipment-state-information storage 5154 and the race card stored in the program information storage 5157.

[0179] When a user performs channel switching control for 00 movie during 10-minute or more viewing and listening and a baseball relay broadcast begins to be watched by operation centering on such a function control part 5151 for example a baseball relay broadcast sees and as shown in drawing 26 1 minute after the start button image is displayed on the monitor 5200. Drawing 26 is a figure showing the state where the recommendation display of the purport that it returns to the original program was made on a monitor.

[0180] As shown in the figure supposing a user pushes the determination button of the remote control in the state where the button image which contains in a monitor the character string of "returning to 00 movie (1-minute progress)" was displayed. The digital broadcasting receiving set 5100 performs the same operation as the case where the user specified the channel of 00 movie and performs channel switching control. Setting 1 minute to the timer for a recommendation display. In CM or a program change to other channels one by one and peruse the contents for a short time. What is called zapping takes about 1 minute for ending -- it was assumed that it would come out -- about the program to which it is viewing and listening and which continue for more than 10 minutes a user likes to continue look at being a sake and setting 10 minutes to the timer for viewing-and-listening decision detection -- it was assumed that it would come out -- it is a sake.

<Embodiment 4> embodiment 4 explains the user interface apparatus which performs a recommendation display based on User Information of the daily life rhythm and taste of a user.

[0181] Hereafter the user interface apparatus concerning the embodiment of the invention 4 is explained using drawing 33 from drawing 27.

<Composition> a digital broadcasting receiving system provided with the user interface apparatus concerning the embodiment of the invention 4. Although it is equivalent to the digital broadcasting receiving system 5000 applied to Embodiment 3 in composition (refer to drawing 23) the functional constitution of the control section of the digital broadcasting receiving system concerning Embodiment 4 differs from the functional constitution (refer to drawing 24) of the control section 5150 in Embodiment 3.

[0182]Drawing 27 is a functional block diagram of the control section 6150 of the digital broadcasting receiving system concerning Embodiment 4. Like the control section 5150 shown in Embodiment 3 the control section 6150 is a portion to perform an execution control function and a user interface control facility and The function control part 6151 consists of the user input reception part 5152 each part control section 5153 of apparatus the equipment-state-information storage 5154 the time-of-day-control department 5155 the GUI control section 5156 the program information storage 5157 and a User Information storage 6158. About the functional division equivalent to the control section 5150 shown in Embodiment 3 the same numerals as drawing 24 are attached among the figure.

[0183] The function control part 6151 by making each part control section 5153 of apparatus control each part of the digital broadcasting receiving set of the receive section 5110 and regenerating section 5130 grade The function corresponding to a user's directions in making a race card incorporate for every hour \*\*\*\* is performed With reference to the equipment-state-information storage 5154 the program information storage 5157 and the User Information storage 6158 a button image is displayed on the GUI control section 5156 if needed using the time-of-day-control department 5155. For these reasons the function control part 6151 decodes a user's directions received by the user input reception part 5152 and takes out directions to each part control-section of apparatus 5153 grade based on this. Here the race card incorporated by the function control part 6151 is stored in the program information storage 5157 in a similar manner with setting to Embodiment 3.

[0184] Although the function control part 6151 is fundamentally [ as the function control part 5151 in Embodiment 3 ] the same it predicts the operation which the user probably desires with reference to User Information and differ in that control for providing the user interface which can perform run designation of the operation concerned at the time of necessity is performed. The User Information storage 6158 stores User Information shown below.

[0185] Drawing 28 is a figure showing the contents of User Information stored in the User Information storage 6158. User Information 6400 consists of the taste genre 6401 the favorite program 6402 the program viewing history 6403 and information peculiar to a user called the daily life rhythm and taste of a user of sleeping time 6404 grade.

[0186] For example the taste genres 6401 are the favorite program genre of users such as a sport and new ten or less shown information and the favorite program 6402 it is ten or less information which shows a user's

favorite program and consists of information on the program name about the program genre performer channel etc. The program viewing history 6403 is ten or less piece information which shows the program to which the user had viewed and listened in the past and consists of information on the program name about the program genre performer channel etc. [0187] The sleeping time 6404 is information which shows a user's life rhythm i.e. the sleeping time as habitual livelihood time. The taste genre 6401 the favorite program 6402 and the sleeping time 6404 It is the information in which the direct entry was carried out by remote control operation etc. by the user and the program viewing history 6403 is the information acquired about the program to which it was viewed and listened according to user's operation when the function control part 6151 referred to a race card.

[0188] A digital broadcasting receiving set <of operation> performs reception of a digital broadcasting program etc. under control of the control section 6150. Two special functions which a digital broadcasting receiving set has here i.e. the program recommendation function to recommend a user viewing and listening about a user's favorite program When the finish time of the program to which a user is viewing and listening passes over the sleeping time which is a user's life rhythm execution operation with the function corresponding to sleeping time to recommend a user the recording of the program concerned is explained.

[0189] First the execution operation about a program recommendation function is explained. Drawing 29 is a flow chart which shows program recommendation processing. If it detects viewing and listening of a certain program having continued the function control part 6151 10 minutes or more by the user and having been made and having carried out viewing-and-listening decision so to speak as shown in the figure (Step S6501) by the end of a program which carried out viewing-and-listening decision It is investigated whether the program which should be recommended to a user is broadcast (Step S6502).

[0190] Namely the function control part 6151 obtains the present time from the time-of-day-control department 5155 By referring to the race card stored in the program information storage 5157 the finish time of the program received now is obtained and it is investigated by searching from a race card whether the program which should be recommended to a user is in the program broadcast among such time. This search is performed using the information of the program name within the favorite program in User Information or the information on a program viewing history a performer etc. using the information on the taste genre in User

Information.

[0191]When the program which should be recommended to a user is not broadcast (Step S6503) and program recommendation processing but, When the program which should be recommended to a user is broadcast (Step S6503) and the character string used as the contents of the button image displayed on a monitor as a recommendation display are determined (Step S6504). The character string concerned is a character string including the program name of the program which should be recommended and the reason for recommending the program and a reason is the genre about the program searched using the information on a taste genre and is the performer name about the program searched using a performer's information.

[0192]For example in Step S6502 when the program searched by \*\*x which is a performer of a user's favorite program is 00 drama the character string used as the contents of the button image is "changing to 00 drama (\*\*x performance)." After determining the character string used as the contents of the button image the function control part 6151 obtains the start time of the program which should be recommended to a user with reference to a race card and sets the time as the time-of-day-control department 5155 (Step S6505). Since the time-of-day-control department 5155 is notified to the function control part 6151 when the set-up time passes if a notice is received (Step S6506) the function control part 6151 will perform a recommendation display (Step S6507) and will end program recommendation processing.

[0193]For example during viewing and listening of a baseball relay broadcast if the time when above-mentioned 00 drama is started comes a button image as shown in drawing 30 will be displayed by monitor by the recommendation display of Step S6507. Drawing 30 is a figure showing the state where the recommendation display of the purport that it changes to a recommendation program was made on a monitor.

[0194]When a user pushes the button image concerned the function control part 6151 controls the receive section of a digital broadcasting receiving set and makes the program receive via each part control section 5153 of apparatus. By this the user can know that 00 drama to which \*\*x which is a performer of a favorite program appears during baseball relay broadcast viewing and listening was started and to watch the program. Only by carrying out the depression of the button image he can watch the program by operating the determination button of the remote control.

[0195]Next the execution operation about the function corresponding to sleeping time is explained. Drawing 31 is a flow chart which shows the processing corresponding to sleeping time. As shown in the figure viewing

and listening of a certain program continued the function control part 6151 10 minutes or more by the user and it was made if it detects having carried out viewing-and-listening decision so to speak (Step S6601) the finish time of the program which carried out viewing-and-listening decision is obtained by referring to a race card and it compares with the sleeping time in User Information (Step S6602). [0196] When the finish time of the program which carried out viewing-and-listening decision is later than sleeping time as a result of the comparison in Step S6602 (Step S6603) The character string used as the contents of the button image displayed on a monitor as a recommendation display is determined (Step S6604) a recommendation display is performed (Step S6605) and the processing corresponding to sleeping time is ended. Thereby a button image as shown in drawing 32 is displayed on a monitor for example.

[0197] Drawing 32 is a figure showing the state where the recommendation display of the purport that a program is recorded on a monitor during viewing and listening was made. It will be the sleeping time as a user's life rhythm at 1:00 a.m. (refer to drawing 28) and the example shown in the figure shows the state where it became after a user begins to watch a baseball relay broadcast at 0:10 a.m. The button image in which recording with the information that it will be the finish time of the baseball relay broadcast concerned at 2:00 a.m. was shown is displayed.

[0198] When a user pushes the button image concerned the function control part 6151 controls the recording part of a digital broadcasting receiving set and makes the program under viewing and listening record via each part control section 5153 of apparatus. Thereby when the finish time of a program can know that it is later than usual sleeping time and wants to record the program during viewing and listening by operating the determination button of the remote control a user can only do the depression of the button image and can carry out reservation of picture recording of the program.

[0199] <Modification> drawing 33 is a line block diagram of the digital broadcasting receiving system 7000 provided with the digital broadcasting receiving set 7100 which is a modification of the digital broadcasting receiving set in Embodiment 4. the digital broadcasting receiving set 7100 -- the broadcast receiving antenna 510 the receive section 5110 the receive section 7110 the recording part 5120 the regenerating section 5130 the outputting part 5140 and a time check -- it having the part 5160 the Records Department 7170 and the control section 7150 and A greatly different point from the digital broadcasting receiving set shown in drawing 23 is a point which was provided with two receive



sections and is further provided with the Records Department 7170.

[0200]Therefore the digital broadcasting receiving set 7100 can receive two programs simultaneously and can record the data of the program on the Records Department 7170 which comprises a hard disk etc. Control of whether the control section 7150 makes the receive section 5110 and the receive section 7110 receive which channel Control of the recording position at the time of recording data on the Records Department 7170 from the receive section 5110 and the receive section 7110 the regenerating section 5130 or the input control through which it passes recording part 5120 and control that is each part in addition to this are performed. Here the input control to the regenerating section 5130 or the recording part 5120 means that the control section 7150 chooses whether the data of either the receive section 5110 the receive section 7110 or the Records Department 7170 is given to the regenerating section 5130 or the recording part 5120.

[0201]By control of the control section 7150 one side receives the program specified as the user among the receive section 5110 and the receive section 7110 and another side receives one recommendation program determined based on User Information. The Records Department 7170 is used by the control section 7150 as a record buffer of ring shape and the newest 2 hours of the data of the program always received by each receive section are recorded.

[0202]In such a digital broadcasting receiving set 7100 of composition. When a button image as shown in drawing 30 is pushed by the user after the program recommended with an above-mentioned program recommendation function was already started the regenerating section 5130 is made to reproduce the control section 7150 from the portion of the beginning of the program concerned using the data of the program currently recorded on the Records Department 7170. For this reason while the control section 7150 displays a button image as shown in drawing 30 it makes a recommendation program receive to the direction which has not received the program under present viewing and listening among the receive section 5110 or the receive section 7110 and the Records Department 7170 is made to record it on it.

[0203]With the function corresponding to sleeping time above-mentioned in the digital broadcasting receiving set 7100. Since the finish time of the program under viewing and listening is later than sleeping time when the button image of the purport that recording is recommended is displayed (refer to drawing 32) and a user pushes the button image concerned The control section 7150 is made to record on the recording part 5120 from the portion of the beginning of the program concerned

using the data of the program under viewing and listening currently recorded on the Records Department 7170. Thereby it is not from the middle and the recording of the whole program is attained.

[0204] As mentioned above, as for this invention although the user interface apparatus concerning this invention was explained based on the embodiment, it is needless to say that it is not restricted to these embodiments. That is, although we decided that a user's operation is made for the recording playback equipment or the digital broadcasting receiving set in a digital broadcasting receiving system in the (1) embodiment, this invention in particular does not limit the apparatus used as a user's operation target.

[0205] Therefore, the user interface apparatus concerning this invention may be used for an analog broadcasting receiving set, a DVD player, a car navigation system, home electronics, a home automation system, etc. for example. As an example for performing the recommendation display based on User Information as shown in Embodiment 4 in the home automation system, when given time comes based on information including a user's life rhythm, etc., a user interface, etc., which performs the recommendation display "I carry out hot water supply to a bath" to the control panel of a home automation system are raised. In this case, if a user performs affirmative directions, hot water supply will be made.

(2) Although we decided to receive the race card broadcast in Embodiments 1-4, even if it acquires a race card via network, such as the Internet, it is good also as reading in the recording medium concerned as being recorded on recording media, such as CD-ROM.

(3) Although Embodiment 1 showed the example which displays on an auxiliary menu "it is broadcast reservation of picture recording next time" etc., immediately after a user makes timed recording. For example, in the situation where the drama has been 5 batch recorded after displaying the item of "playing a part for next time" on an auxiliary menu after finishing playing the 2nd time and finishing playing the 5th time, it is good also as displaying the item of "being broadcast reservation of picture recording next time" on an auxiliary menu. For this reason -- being alike -- what is necessary is to suppose that information including the drama name, etc., of the recorded drama is managed and just to suppose that an auxiliary menu suitable for a situation is displayed after judging whether the drama for next time is recorded and whether a broadcast schedule occurs with reference to the information concerned and race card.

(4) The user interface which displays an auxiliary menu automatically based on operation of the run state apparatus, or a user's past as shown

by Embodiment 1The user interface which displays the auxiliary menu which originates in a user's as showed by Embodiment 2 operationand includes a keyword and a function itemIt may have as [ both ] a user interface of one apparatusIt may prepare for one apparatus with the user interface of otherssuch as a user interface which displays the auxiliary menu which can choose easily the function once performed in the past based on a user's operationIt is good also as the ability of a user to use these user interfaces selectively.

[0206]Although a decision of the item which should be displayed on the auxiliary menu in Embodiment 1 was made according to the auxiliary menu item display condition (refer to drawing 6) of auxiliary menu item informationIt is good also as carrying out by calculating the evaluation value to each function item based on information like the semantic relation information 3530and a function item and keyword state information 3540 which showed this by Embodiment 2 (refer to drawing 21). The auxiliary menu item deciding part 1416 Namelyeach element of execution instruction informationBy considering that each element of equipment state information is a thing equivalent to the keyword in Embodiment 2and considering that the value of each of these elements is an input value to the node corresponding to the keywordBased on a principle as shown in drawing 21the evaluation value about the node corresponding to each function item may be updated one by oneand the function item which should be displayed on an auxiliary menu may be determined according to the evaluation value which the node about each function item holds.

[0207]In order to display the auxiliary menu which can choose easily the function once performed in the past based on a user's operationWhenever the operation reception part 1411 generates execution control informationas attaching a sequence numberWhat is necessary is just to define the order of the function item which should be displayed on an auxiliary menu with reference to this sequence number as including this sequence number in execution control informationand storing in execution instruction and the equipment-state-information storage parts store 1412. It may be made for the function item displayed on an auxiliary menu in this case to display the function item name drawn on the button image of the basic menu which is equivalent to the major item of the execution instruction information in execution control informationa mean eyeand a subparagraphfor example.

(5) The number of button images and arrangement which the form of the auxiliary menu shown in each of Embodiment 1 and Embodiment 2 is not limited to thisand were displayed on the auxiliary menu may also be what

kind of thing. Although the auxiliary menu item which the auxiliary menu item deciding part 1416 should display based on the priority of auxiliary menu item information in Embodiment 1 was determined for example based on such a priority the button image about the high function of a priority may be displayed on the position which is easy to choose. [0208] In order to show the function which a user should be made to choose in an embodiment decided to display the button image which is a picture which drew the name of the function item by the character string but. It is not limited to this shape and the function which a user should be made to choose by the icon describing the picture which a user can understand easily etc. may be shown.

(6) Although the apparatus which receives a user's operation was used as the remote control 1300 or the remote control 5300 in the embodiment the apparatus which is not limited to this and receives a user's operation may be pointing devices keyboard etc. such as a mouse for example.

[0209] In the embodiment in order to show to a user the information including choice etc. which can be specified the method of displaying on a display was used but a sound etc. may be used. In showing the keyword which serves as a choice using a sound It is the timing which should just read out the keyword and by which the keyword which a user wants to choose to this was read out and what is necessary is just to suppose that it inputs choosing by performing voice input through voice recognition equipment through input devices such as a remote control a keyboard and a mouse.

[0210] Although the remote control 1300 shall be provided with the remote control button for operating a basic menu and the remote control button for operating an auxiliary menu it is good also as supposing that a remote control button is shared being able to creep simultaneously and being able to perform only operation to that menu. However the remote control button for operating a basic menu and an auxiliary menu like the remote control 1300 respectively to have independently. Since there is an advantage which can provide the user interface which positioned cursor in each menu simultaneously when two menus are displayed on monitor display this advantage will be lost when a remote control button is shared.

[0211] In the case where a remote control button is shared If it is a case where the basic menu is already displayed when the control section 1110 in Embodiment 1 displays an auxiliary menu It can avoid interrupting operation by a user's basic menu by performing cursor control which does not position cursor to the auxiliary menu side at first.

(7) The "major item" the "mean eye" and the "subparagraph" which were made

into the element of the execution instruction information in the execution control information stored in the execution instruction and the equipment-state-information storage parts store 1412 in an embodiment may not follow according to the hierarchy of a basic menu. [0212] "The setting out 1" the "setting out 2" the "setting out 3" the "object 1" etc. are not restricted to the contents which also showed the equipment state information which is not limited to this and stored in execution instruction and the equipment-state-information storage parts store 1412 to the embodiment as an element of execution instruction information. It is used in order that the element of the information stored in execution instruction and the equipment-state-information storage parts store 1412 may judge the conditions for determining the auxiliary menu item which should be displayed on the auxiliary menu in Embodiment 1 no matter it may be what contents.

[0213] Although it presupposed the execution control information in execution control information that values such as "un-decoding" and "execution waiting" are taken it is not limited to this. The procedure of the functional execution control part 1413 in Embodiment 1 is not restricted to the procedure shown in the flow chart of drawing 10. Based on the execution control information reflecting a user's operation if execution control of a function grant (Step S111S116) of auxiliary menu indication timing etc. are performed it may be what kind of thing. For example execution control information is good also as not taking the value waiting for [execution "realizing reservation of picture recording to be execution of one function and treating that it is equivalent to an immediate-execute type function and good also as giving auxiliary menu indication timing several seconds after receiving a user's operation.

(8) Although we decided to use the value of each element of the execution control information and equipment state information which are stored in execution instruction and the equipment-state-information storage parts store 1412 as conditions for the judgment for determining the auxiliary menu item which should be displayed on an auxiliary menu in Embodiment 1 it is good also as using only the information relevant to a user's operation as this condition and is good also as using only the information about the state of each part of apparatus and these may be compounded and used.

(9) The auxiliary menu indication timing control section 1415 in Embodiment 1 it is good also as issuing directions so that the auxiliary menu item repeatedly displayed [ from the timing given from the functional execution control part 1413 ] on an auxiliary menu at the auxiliary menu item deciding part 1416 two or more times for every

predetermined time may be determined. It is good also as adjusting timing oneself regardless of the functional execution control part 1413 and taking out said directions to the auxiliary menu item deciding part 1416. Though an auxiliary menu comes to be displayed by this for example while displaying a basic menu since the remote control button of the remote control 1300 for operating each menu changes with it the user can operate any menu.

(10) By the auxiliary menu control section 1418 decided to eliminate automatically when a user's operation interrupted the auxiliary menu for Embodiment 1 for 10 seconds but. It is good also as eliminating as an opportunity the case where it is not limited to 10 seconds and buttons other than the button for auxiliary menu manipulation of the remote control 1300 are pushed by the user etc.

[0214] When a user's operation is interrupted and the auxiliary menu shown in Embodiment 2 also leaves 10 seconds or more it is good also as the auxiliary menu control section 3418 eliminating.

(11) In Embodiment 1 in order to determine the auxiliary menu item we decided to refer to the auxiliary menu item priority defined beforehand but it is not limited to this and it is not necessary to determine the auxiliary menu item according to a priority.

[0215] When using a priority a priority does not need to be eternal for example the auxiliary menu item corresponding to the function once chosen as the user is good also as a priority increasing and the more it uses it according to this the more the user interface which becomes convenience can be provided.

(12) In Embodiment 2 the semantic relation information 3530 carried out the separate semantic relation from the primary side suddenly about the both directions from a secondary to a primary side to the secondary and its semantic relation is good also as the same thing in both directions.

[0216] Although all dignity in the semantic relation information 3530 was set to 1 it is not limited to this and dignity is good also as taking various values. In this case with that value weighting of output V [0] in drawing 2 the V [1] etc. will be carried out and they will be inputted respectively.

(13) Display key word determination processing which the auxiliary menu control section 3418 in Embodiment 2 performs may be performed in procedures other than the procedure of the flow chart of drawing 22 for example it is good also as a thing except processing of Step S502 and Step S507.

[0217] moreover -- as the auxiliary menu control section 3418 not updating a keyword button image when a keyword is chosen as a user -- the

renewal of a keyword --- "--- others --- it is good also as carrying out only when word display" is chosen. That is it may be made to perform Step S404 without performing Step S403 after Step S409 in the flow chart of drawing 29.

(14) Although one button image showed the example displayed on a monitor by Embodiment 4 (refer to drawing 30) when there are two or more programs which should be recommended to a user two or more button images may be displayed. It is possible to display the button image for displaying the program which should be recommended and the button image for recording the program concerned etc. When one of button images is chosen by the user operation of apparatus should just be made according to the contents.

(15) Although a taste genre a favorite program etc. in User Information shown by Embodiment 4 were made into ten or less pieces they are not limited to this and may attach a priority to each. For example when attaching a priority to a taste genre and considering it as the No. 1 sport the No. 2 news and the No. 3 movie. When two or more programs recommended based on this taste genre are searched it is good for order also as an object of a recommendation display of only a predetermined number from what was searched based on what has a high priority.

(16) The button image for a recommendation display explained by Embodiments 3 and 4 is good also as the ability to carry out [ non-display ]-izing of the user by remote control operation. The button image shown by Embodiment 3 of "returning to 00 movie (1-minute progress)" is good also as becoming non-display when a user performs a channel change on 00 movie by the usual remote control operation.

(17) In Embodiments 3 and 4 although it was considered as viewing-and-listening decision by continuous viewing and listening for 10 minutes or more of the same channel it is not limited to 10 minutes. It is good also as viewing-and-listening decision by judging with reference to a race card to have the continuation of viewing and listening for 10 minutes or more of an identical program.

(18) Although we decided to recommend the program broadcast by the finish time of the program under present reception in the program recommendation function shown by Embodiment 4 it is good also as performing processing which recommends the program which is not limited to this for example is broadcast within several minutes from current time every several minutes.

(19) In the program recommendation function shown by Embodiment 4 the reasons of "" (\*\*x performance) etc. which are included in the button image for a recommendation display may be looking every week to which it is limited to neither a genre name nor a performer name for example had

viewed and listened in the past etc. When it attaches a reason even if it does not specify a reason it is good also as attaching partial pictures such as a character string a figure etc. which are suggested.

(20) According to Embodiment 4 especially User Information may be classified about the multiple user although not classified about a multiple user. For example it is made to make User Information input as each user's name etc. and a pair and each user will have a separate remote control well also as performing the recommendation display of the program etc. which write in addition and recommend a user's name By distinguishing with which remote control the digital broadcasting receiving set is operated it is good also as performing the recommendation display only relevant to the user who is operating it.

(21) In the function corresponding to the sleeping time shown by Embodiment 4 immediately after viewing-and-listening decision when program finish time was later than sleeping time we decided to perform a recommendation display but after not being limited to this and approaching sleeping time it is good also as performing a recommendation display. When program finish time is later than sleeping time it may not indicate by recommendation but when program finish time is 30 minutes or more later than sleeping time it may be indicating by recommendation etc.

(22) The procedure about the execution control function of the control section 1110 and user interface control facility in Embodiment 1 (drawing 10 procedure of the flow chart of drawing 12 etc.) The procedure about auxiliary menu control of the auxiliary menu control section 3418 in Embodiment 2 (drawing 20 procedure of the flow chart of drawing 22 etc.) Or the computer program for making the electrical household appliances and electrical equipment which have a general-purpose computer or a program execution function perform procedure (drawing 25 drawing 29 the procedure of the flow chart of drawing 31 etc.) about control of the recommendation display in Embodiment 3 and Embodiment 4 It can record on a recording medium or can be made to be able to circulate via various channels etc. and can also distribute. There are an IC card an optical disc a flexible disk a ROM etc. in this recording medium. The computer program circulated and distributed By being installed in electrical household appliances and electrical equipment a personal computer etc. which have a program execution function it is appropriated for the use and electrical household appliances and electrical equipment and a personal computer The computer program concerned is executed and many functions about a user interface as shown in Embodiment 1 - Embodiment 4 are realized.

[0218]



[Effect of the Invention] This invention receives the user's operation to apparatus and as for the user interface apparatus concerning this invention is characterized by that the user interface apparatus which notifies the execution instruction of various operations to said apparatus according to user's operation comprises the following so that clearly from the above explanation.

The prediction means which predicts one or more operations which the user probably expects execution.

A user interface means to provide the user interface for making a user specify one of the operations about said one or more [ which was predicted that a user probably desires execution by said prediction means ] operations and to receive specification by a user.

The reporting means which notifies the execution instruction about operation concerning a user's specification received by said user interface means to said apparatus.

[0219] In order that the system provided with the user interface apparatus concerning this invention by this may predict the functional operation for which a user asks the probability that the user can perform execution instruction of desired functional operation simply increases. Since the user interface that execution of the functional operation concerned can be performed only by specifying about the predicted functional operation is provided even if it does not discover desired functional operation from a deep hierarchy's hierarchical menu a user becomes easy [ execution instruction ]. Here it says specifying the functional operation prediction is not directly instructed to be by the user based on the information etc. which the state of apparatus and the user inputted for example.

[0220] According to the user interface apparatus concerning this invention. For example recommendation of the execution instruction of the functional operation that there is meaning of execution although an immediate execute is not necessarily required which recommends a user the execution instruction of the functional operation which leads to the resource release in the state of a system resource where it became insufficient feeling somewhat is also attained. Therefore the execution instruction of functional operation for which it will ask if it is recommended although the user has not done consciousness at the time can also be made to give a user easily.

[0221] Here also suppose that said user interface means is provided spontaneously without waiting for offer directions according said user interface to a user. By this the system using the user interface

apparatus concerning this invention Since it predicts and the user interface which is a choice of functional operation is spontaneously shown even if a user does not require it becomes easy to use the system concerned for the entry level user which can also propose execution instruction to a user and does not grasp the function of the system concerned as a result about the functional operation which does not necessarily need to be performed. Here it says providing by prescribed timing oneself rather than providing a user interface according to the request designation according [ providing spontaneously ] to a user.

[0222] Said user interface apparatus is provided with the User Information storing means which stores User Information which is information still more peculiar to a user and said prediction means After the state of said apparatus turns into a prescribed position also suppose that said prediction is performed based on said User Information stored in said User Information storing means. Thereby the user interface apparatus concerning this invention can propose operation of the apparatus optimal for a user to a user by predicting operation of apparatus based on a situation peculiar to a user etc. Thereby the user can perform operation optimal for the proposed self to apparatus simply. Therefore this invention is not general-purpose operation for the whole general user and provides the user interface for making a certain user specify operation for exclusive use.

[0223] Said User Information is the taste information about a user's taste and also suppose said prediction means that the operation which suits a user's taste based on said taste information is predicted. Thereby the user interface apparatus concerning this invention can propose to a user operation of the apparatus with which the user is probably pleased by predicting based on a user's taste. Therefore if a user stores the information about a self taste in the User Information storing means she can receive offer of a means by which operation suitable for a self taste can be directed easily.

[0224] Said User Information is the life rhythm information about a user's life rhythm and when said prediction means maintains a user's life rhythm based on said life rhythm information also suppose it that required operation is predicted. Thereby the user interface apparatus concerning this invention can propose to a user operation of apparatus which meets a user's lifestyle by predicting based on the information about a user's life rhythm. Thereby the user can make apparatus perform operation required of the easy operation of specification of operation in order to maintain a lifestyle etc.

[0225] Said user interface is provided by displaying the picture for

making a user specify either of said one or more [ which was predicted that as for said user interface means a user probably desires execution by said prediction means ] operations. Also suppose that the partial picture which shows the reason for said prediction is included in said picture. Since this gives a reason to the button image etc. which form a graphical user interface the user can understand the meaning of a button image etc. without getting confused at the button image etc. having been displayed suddenly.

[0226] Said apparatus is the picture of the received program a broadcast receiving set displayed on a monitor and said User Information storing means store said User Information about the user of said broadcast receiving set and said user interface means. Also suppose that said user interface is provided by displaying the picture for making a user specify either of said one or more [ which was predicted that a user probably desires execution by said prediction means ] operations on said monitor.

[0227] By this the user interface apparatus concerning this invention. Since it is utilized as a user interface of a broadcast receiving set. The user can make the recommended action concerned perform to a broadcast receiving set simply by carrying out the depression of the button image etc. in which the recommended action displayed on the monitor of a broadcast receiving set is shown. For example via input devices such as a remote control. Recommended actions include a channel change in the program suitable for a user's taste etc. for example.

[0228] The race card storing means which stores the race card which comprises information relevant to the program of further plurality [ user interface apparatus / said ]. Receive the input of User Information by a user. Have the User Information receiving means stored in said User Information storing means and said User Information. Are the taste of the user about a program the shown program taste information and said user interface means. With reference to said race card based on said program taste information are programs other than the program which said broadcast receiving set is receiving and the program suitable for a user's taste is searched. Also suppose that the picture for making a user specify execution of the operation which changes the receiving pair elephant of said broadcast receiving set to the program concerned is displayed on said monitor.

[0229] By this the user interface apparatus concerning this invention. Since it has a user interface which can perform the change to the program on a different channel suitable for the taste of the user of

a broadcast receiving setHe can begin to watch a favorite program now by easy operationwithout a user's overlooking a favorite program and watching other programs by inputting the information about a self taste beforehand.

[0230] Said user interface apparatus is provided with the race card storing means which stores the race card which comprises information relevant to further two or more programsand said User InformationAre the sleeping time as a user's life rhythm the shown sleeping time informationand said user interface meansWith reference to said race card and said sleeping time informationthe finish time and said sleeping time of a program which said broadcast receiving set is receiving are comparedWhen said finish time is later than said sleeping timealso suppose that the picture for making a user specify execution of the operation which records the program concerned is displayed on said monitor.

[0231] Therebyin order to assist that the user interface apparatus concerning this invention maintains the life rhythm about a user's sleepingit becomes easy for a user to maintain fixed sleeping time. The commonplace maneuver receiving means which said user interface apparatus are user's operation other than said specification which said user interface means receives furtherand receives the user's operation to said apparatusThe general reporting means which notifies said execution instruction to said apparatus according to the user's operation received by said commonplace maneuver receiving meansIt can have the holding mechanism holding the execution instruction information about said execution instruction according to the user's operation received by said commonplace maneuver receiving meansand also suppose said prediction means that said prediction is performed based on said execution instruction information currently held at said holding mechanism.

[0232] Therebythe user interface apparatus concerning this invention does not spoil operativity about operation except selection of the functional operation predicted that a user will wanteitherin order to also receive a user's normal operation via a commonplace maneuver receiving means. The probability that operation of the request for a user can be specified easily increases further by predicting based on the execution instruction of operation of the apparatus already formed by the user. Thereforeby examining what according to the user interface apparatus concerning this inventionthe operation which a user expects to the next of the run designation of a certain operation isincorporating as contents of prediction judgment of a prediction meansand raising predictabilityThe graphical user interface which displayed the choice

which can perform easily execution instruction of the functional operation for which it asks to a user's truth can be provided now.

[0233]When [ at which said prediction means is based on said apparatus ] the end of execution of one operation is detected it performs said prediction and when said prediction is made by said prediction means also suppose said user interface means that said user interface is provided. Since a user generally desires execution of some functional operation after execution of functional operation by this again in many cases the probability that the user interface to provide will become useful increases.

[0234]Said apparatus records two or more programs and reproduce each program currently recorded are a program recording and reproducing device displayed on a monitor and said prediction means When it detects that one program in a series of programs was reproduced by said program recording and reproducing device A user predicts the operation which reproduces the program which follows said one program in a series of programs as one of the operations which probably desire execution and it said user interface means Also suppose that said user interface is provided by displaying the picture for making a user specify either of said one or more [ which was predicted that a user probably desires execution by said prediction means ] operations on said monitor.

[0235]Thereby the user can perform easily the directions which reproduce the program which follows the program reproduced [ the ] after reproduction of a certain program in the program of a recorded series to a program recording and reproducing device. When you detect that all the operations of the user who should be made in order to perform one operation to said apparatus were completed also suppose said prediction means that said prediction is performed.

[0236]Thereby since a user desires execution of a certain functional operation further in many cases at the time of user's operation completion the probability it becomes useful predicting increases. When it is that to which operation concerning a user's specification received by said user interface means needs the setup information based on a user's operation for the execution said reporting means Also suppose that said execution instruction included said setup information is generated and the execution instruction concerned is notified to said apparatus by referring to the execution instruction information currently held at said holding mechanism.

[0237]It becomes unnecessary thereby for a user to input again the object of functional operation etc. which were inputted once. The system using the user interface apparatus where this starts this invention conversely

also means coming that it can perform offer of the function using information including the object of functional operation etc. which were inputted into the user in the past effectively. For example although the time the channel and other information and input which are usually recorded in recording playback equipment when the execution instruction of a recording function is made by the user are also carried out such information can be used in the function etc. "which carry out reservation of picture recording of the program for next time."

[0238] Even if a much more convenient function does not adapt itself to a certain hierarchical menu easily from the former and it positions it in a hierarchical menu for a user such as "carrying out reservation of picture recording of the program for next time" the whereabouts in the menu of the function cannot be easily grasped by the user but. This invention has an effect which carries out facilitating of solving these problems and providing the still more convenient function for a user in a system.

[0239] Have said prediction means and the priority storage parts store which memorizes further the priority information which defined the priority about each operation of said apparatus said prediction means Also suppose that the operation below or more 1 predetermined number is predicted by referring to said priority information memorized by said priority storage parts store. Since numbers i.e. the number of choices such as a button image displayed as a user interface are extracted by this it becomes intelligible for a user.

[0240] They are user's operation other than said specification which said user interface means receives to said user interface apparatus panel Have a commonplace maneuver receiving means which receives the user's operation to said apparatus and said commonplace maneuver receiving means Have a manual operation button which is a thing appropriated for a user's use display the picture for supporting a user's operation and the user's operation corresponding to the picture concerned is received via the manual operation button concerned Said user interface means has what is a designation button which is a different thing from said manual operation button and is appropriated for a user's use and can also presuppose it that a user's specification is received via the designation button concerned.

[0241] The degree which does not spoil the normal operation nature for the user who does not use a user interface for this to specify the predicted functional operation increases and Normal operation Since the button which should be used about each operation with operation of specifying the predicted functional operation is separate as for a

useroperation becomes intelligible. The reception means which said apparatus is a broadcast receiving set which displays the received picture on a monitorand receives the program of a certain channelAfter the program of the 1st channel was continuously received by said reception means the 1st more than hourAfter the channel which said reception means receives according to user's operation is changedhave a state detecting means which detects that it is in the state in which the 2nd hour passedand said prediction meansWhen said detection is made by said state detecting meansas an operation for which the user will askpredict the 1st-channel [ said ] switching operation and said user interface meansDisplay the picture for making a user specify execution of the 1st-channel switching operation predicted by said prediction means on said monitorreceive specification by a userand said broadcast receiving setWhen the 1st-channel switching operation is notified by said reporting meansit can also carry out to controlling said reception means and making said program of the 1st channel receive.

[0242]The broadcast receiving set with which the user interface apparatus concerning this invention is used by thisAlthough viewed and listened to a program with a userwhen it changes to other channels temporarily [ CM is broadcast / between ]It can prevent forgetting for a user to watch the original programand a user only chooses the picture for a channel change displayed on a monitorand can begin to watch the original program immediately.

[0243]The evaluation value storing means in which said user interface apparatus stores the evaluation value corresponding to each operation of said apparatus furtherThe semantic-relations information storage means which memorizes the semantic-relations information about the semantic relation between each operation of said apparatusand two or more keywords of eachThe keyword receiving means which receives specification of said keyword by a userThe initializing means which initializes the evaluation value stored in said evaluation value storing means to a predetermined valueWith reference to said semantic-relations informationit has an evaluation value increasing means to which the evaluation value corresponding to the operation which is semantically related to the keyword concerning said specification received by said keyword receiving means is made to increaseWhen said specification is received by said keyword receiving meanssaid prediction meansBased on the evaluation value corresponding to each operation stored in said evaluation value storing meansSaid prediction can be performed with specifying operation of a predetermined number sequentially from what has a large evaluation valueand also suppose said user interface means

that the user interface for making a user specify either of the operations of said predetermined number predicted by said prediction means is provided.

[0244]It is a user who operates by this the system in which various functional operation is possible and the user who has not remembered the menu hierarchy etc. can be provided with the graphical user interface as which desired functional operation is made to choose it simply. Said keyword receiving means is an exclusive menu for making operation of said apparatus for which it asks to a user specify further. The exclusive menu in which two or more at least one and keywords which have relation semantically were included among operations of said apparatus. After building and displaying by referring to said semantic-relations information, receive specification of said keyword by a user and said user interface means. Also suppose that said user interface is provided by displaying the picture for making a user specify either of the operations of said predetermined number.

[0245]In order to make him choose it by this rather than to make a single-character [ every ] direct target input a keyword into a user's memory burden is not applied to a user. Said specification in which said specification which said keyword receiving means receives and said user interface means receive said user interface apparatus further. The commonplace maneuver receiving means which is the user's operation of an except and receives the user's operation to said apparatus. Have a general reporting means which notifies said execution instruction to said apparatus according to the user's operation received by said commonplace maneuver receiving means and said commonplace maneuver receiving means. Have a manual operation button which is a thing appropriated for a user's use, display the picture for supporting a user's operation and the user's operation corresponding to the picture concerned is received via the manual operation button concerned. Have said user interface means and what is a designation button which is a different thing from said manual operation button and is appropriated for a user's use said keyword receiving means. Specification of said keyword by a user can be received via said designation button and also suppose said user interface means that specification of said operation by a user is received via said designation button.

[0246]The manual operation button for not spoiling the operativity of the usual hierarchical menu for the user not using the selection method using a keyword and performing the selection method using a keyword by this. Since the button which operates the usual hierarchical menu is distinguished, operation of a user becomes intelligible. The broadcast



receiving set which this invention requires for this invention is characterized by that the broadcast receiving set which displays the picture of the received program on a monitor comprises:

An execution control means to control each part of the inside of a self-device according to the directions concerned and to perform various operations in response to directions.

The User Information storing means which stores User Information which is information peculiar to the user of a self-device.

After the state of a self-device turns into a prescribed position based on said User Information stored in said User Information storing means, a user interface means to display the picture for making a user specify execution of the operation concerned on said monitor about one or more operations predicted that a user probably desires execution and to receive specification by a user.

The reporting means which gives the execution instruction of operation concerning a user's specification received by said user interface means to said execution control means.

[0247] Since it is what displays the button image for the broadcast receiving set concerning this invention predicting by this the operation for which the user will ask based on the situation peculiar to a user etc. and specifying the predicted recommended action etc. on a monitor, a user can make a recommended action perform to a broadcast receiving set simply by carrying out the depression of the button image concerned etc. via input devices such as a remote control now. Therefore, this invention is not general operation and provides the user interface for making the user of the broadcast receiving set concerned specify a recommended action for exclusive use.

[0248] Said broadcast receiving set is provided with the race card storing means which stores the race card which comprises information relevant to further two or more programs and said User Information. Are the taste of the user about a program the shown program taste information and said user interface means. With reference to said race card, it is programs other than the program under reception and the program suitable for a user's taste can be searched based on said program taste information and also suppose that the picture for making a user specify execution of the operation which changes a receiving pair elephant to the program concerned is displayed on said monitor.

[0249] Thereby, since the broadcast receiving set concerning this invention is provided with the user interface which can perform the change to the program on a different channel suitable for a user's taste, the user can

begin to watch a favorite program by easy operation without overlooking a favorite program and watching other programs. Further said broadcast receiving set can receive the input of User Information by a user and can also presuppose it that it has the User Information receiving means stored in said User Information storing means.

[0250] Thereby the user of the broadcast receiving set concerning this invention can make operation suitable for a self taste perform to a broadcast receiving set easily if the information about a self taste is beforehand inputted into the broadcast receiving set. Also suppose that it has a reception program information acquisition means which said broadcast receiving set acquires the information about the program further received by referring to said race card and is stored in said User Information storing means by making the information concerned into said program taste information.

[0251] Thereby the user of the broadcast receiving set concerning this invention can begin to watch the program etc. to which it views and listens by easy operation every week without overlooking the program etc. to which it views and listens every week and watching other programs. Said broadcast receiving set is provided with the race card storing means which stores the race card which comprises information relevant to further two or more programs and said User Information. Are the sleeping time as a user's life rhythm the shown sleeping time information and said user interface means. With reference to said race card and said sleeping time information the finish time and said sleeping time of a program under reception are compared and when said finish time is later than said sleeping time also suppose that the picture for making a user specify execution of the operation which records the program concerned is displayed on said monitor.

[0252] In order to assist that the broadcast receiving set concerning this invention maintains the life rhythm about a user's sleeping by this for a user it becomes easy to maintain a life rhythm. Said broadcast receiving set is provided with the temporary storage means which memorizes the data of the received program temporarily further and said execution control means. When the execution instruction of said operation to record is told by said reporting means it can also carry out to making the program concerned record on the recording means in a self-device from the portion received before the time of the execution instruction concerned being told using the data of the program memorized by said temporary storage means.

[0253] In order to perform recording from the portion before the broadcast receiving set concerning this invention receives recording

start directions by this the recorded program tends to view and listen to a user later. Also suppose that the partial picture which shows the reason for said prediction is included in the picture which said user interface means displays. Since the broadcast receiving set concerning this invention gives a reason to the button image etc. which are displayed on a monitor by this in order to make a user specify operation the user can understand the meaning of a button image etc. without getting confused at the button image etc. having been displayed suddenly.

[0254] The broadcast receiving set which this invention requires for this invention is characterized by that the broadcast receiving set which displays the received picture on a monitor comprises:

The reception means which receives the program of a certain channel. The state detecting means which detects that it is in the state in which the 2nd hour passed after the channel which said reception means receives according to user's operation after the program of the 1st channel is continuously received by said reception means the 1st more than hour was changed.

A user interface means to display the picture for making a user specify execution of the 1st-channel [ said ] switching action on said monitor and to receive specification by a user when said detection is made by said state detecting means.

The reception control means which controls said reception means and makes said program of the 1st channel receive when a user's specification is received by said user interface means.

[0255] By this although the broadcast receiving set concerning this invention was viewing and listening to a program with a user when it changes to other channels temporarily [ CM is broadcast / between ] It can prevent forgetting for a user to watch the original program and a user only chooses the picture for a channel change displayed on a monitor and can begin to watch the original program immediately.

[0256] After a channel is changed into said picture which said user interface means displays from the 1st channel also suppose that the partial picture which shows that the 2nd hour passed is included. Since the broadcast receiving set concerning this invention gives a reason to the button image etc. which are displayed on a monitor by this in order to make a user specify operation the user can understand the meaning of a button image etc. without getting confused at the button image etc. having been displayed suddenly.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is a lineblock diagram of the digital broadcasting receiving system 1000 provided with the user interface apparatus concerning the embodiment of the invention 1.

[Drawing 2] It is a functional block diagram of the control section 1110 in the digital broadcasting receiving system 1000.

[Drawing 3] It is a figure showing the data which the execution instruction and the equipment-state-information storage parts store 1412 in the control section 1110 memorize.

[Drawing 4] It is a figure showing the basic menu hierarchy structure information included in the basic menu indication control information memorized by execution instruction and the equipment-state-information storage parts store 1412.

[Drawing 5] It is a figure showing an example of the data which execution instruction and the equipment-state-information storage parts store 1412 memorize.

[Drawing 6] It is a figure showing the data which the auxiliary menu item information storage part 1417 memorizes.

[Drawing 7] It is a figure showing the example of the auxiliary menu item information memorized by the auxiliary menu item information storage part 1417.

[Drawing 8] It is a figure showing the example of the auxiliary menu item information memorized by the auxiliary menu item information storage part 1417 like drawing 7.

[Drawing 9] It is a figure showing transition of the screen of the monitor 1200 corresponding to a user's operation.

[Drawing 10] It is a flow chart which shows operation of the functional execution control part 1413 relevant to execution control information.

[Drawing 11] It is a figure showing transition of the screen of the monitor 1200 which follows transition of the screen shown in drawing 9.

[Drawing 12] It is a flow chart which shows the operation relevant to the display of the auxiliary menu by the control section 1110.

[Drawing 13] It is a figure showing transition of the screen displayed on the monitor 1200.

[Drawing 14] It is a lineblock diagram of the digital broadcasting receiving system 3000 provided with the user interface apparatus concerning the embodiment of the invention 2.

[Drawing 15] It is a functional block diagram of the control section 3110

in the digital broadcasting receiving system 3000.

[Drawing 16] It is a figure showing transition of the auxiliary menu displayed on some monitors 1200.

[Drawing 17] It is a figure showing the data which the auxiliary menu indication control information storage section 3417 memorizes.

[Drawing 18] It is a figure which illustrates the list of the number of the function item information 3510 and function item names.

[Drawing 19] It is a figure which illustrates the number of the keyword information 3520 and the list of keywords.

[Drawing 20] It is a flow chart which shows operation of the auxiliary menu control section 3418.

[Drawing 21] It is a figure showing the principle of the updating operation of a function item and keyword state information.

[Drawing 22] It is a flow chart which shows the display key word determination processing which the auxiliary menu control section 3418 performs.

[Drawing 23] It is a lineblock diagram of the digital broadcasting receiving system 5000 provided with the user interface apparatus concerning the embodiment of the invention 3.

[Drawing 24] It is a functional block diagram of the control section 5150.

[Drawing 25] It is a flow chart which shows the processing corresponding to the program switching control which the function control part 5151 performs the timer time progress processing for a recommendation display and the timer time progress processing for viewing-and-listening decision detection.

[Drawing 26] It is a figure showing the state where the recommendation display of the purport that it returns to the original program was made on a monitor.

[Drawing 27] It is a functional block diagram of the control section 6150 of the digital broadcasting receiving system concerning Embodiment 4.

[Drawing 28] It is a figure showing the contents of User Information stored in the User Information storage 6158.

[Drawing 29] It is a flow chart which shows program recommendation processing.

[Drawing 30] It is a figure showing the state where the recommendation display of the purport that it changes to a recommendation program was made on a monitor.

[Drawing 31] It is a flow chart which shows the processing corresponding to sleeping time.

[Drawing 32] It is a figure showing the state where the recommendation display of the purport that a program is recorded on a monitor during

viewing and listening was made.

[Drawing 33] It is a lineblock diagram of the digital broadcasting receiving system 7000 provided with the digital broadcasting receiving set 7100 which is a modification of the digital broadcasting receiving set in Embodiment 4.

[Drawing 34] It is a figure showing the video system 9000 which is an example of conventional electrical household appliances and electrical equipment provided with the navigational panel which displays a hierarchical menu.

[Drawing 35] It is a figure showing the layered structure of the function item displayed as a button image in the navigational panel 9210.

[Description of Notations]

1000 Digital broadcasting receiving system

1100 Recording playback equipment

1110 Control section

1120 Records Department

1130 Broadcast receiving antenna

1140 Receive section

1150 Coding part

1160 Regenerating section

1170 Outputting part

1200 Monitor

1300 Remote control

1310 Power button

1320 Menu button

1330 Cursor advance button

1350 Cursor advance button

1370 Determination button

1380 The button for auxiliary menu manipulation

1381 Auxiliary determination button

1382 Auxiliary cursor advance button

1383 Auxiliary cursor advance button

1411 Operation reception part

1412 Execution instruction and an equipment-state-information storage parts store

1413 Functional execution control part

1414 Image data memory section

1415 Auxiliary menu indication timing control section

1416 Auxiliary menu item deciding part

1417 Auxiliary menu item information storage part

1418 Auxiliary menu control section

1419 Auxiliary menu manipulation reception part  
1420 Auxiliary menu indication part  
5000 Digital broadcasting receiving system  
5100 Digital broadcasting receiving set  
5101 Broadcast receiving antenna  
5110 Receive section  
5120 Recording part  
5130 Regenerating section  
5140 Outputting part  
5150 Control section  
5151 Function control part  
5152 User input reception part  
5153 Each part control section of apparatus  
5154 Equipment-state-information storage  
5155 Time-of-day-control department  
5156 GUI control section  
5157 Program information storage  
5160 a time check -- a part  
5200 Monitor  
5300 Remote control

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